

# START

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WHC-MR-0236

## 200-BP-1 Groundwater Analysis Project, Parameters of Interest, Data Package Report No. 1

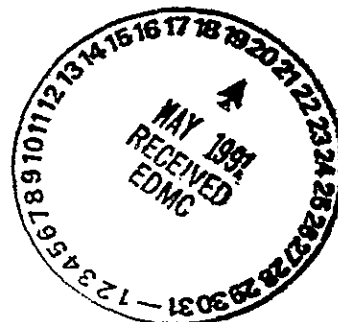
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Prepared for the U.S. Department of Energy  
Office of Environmental Restoration and  
Waste Management



**Westinghouse**  
**Hanford Company** Richland, Washington

Hanford Operations and Engineering Contractor for the  
U.S. Department of Energy under Contract DE-AC06-87RL10930



Approved for Public Release

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DISCLM-2.CHP (1-91)

100-443886-100

### Summary of Parameters of Interest Data by Well

# ABBREVIATIONS

- NR not required and/or requested
- U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
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SAMPLE IDENTIFICATION KEY	699	52 - 57	049	A, B, C, etc.
	area (699 = 600 Area) (299 = 200 Area)	well number	depth of sample	duplicate, equipment blank, field blank, or trip blank

## WELL 699-52-57 - PARAMETERS OF INTEREST - SOIL SAMPLES

SAMPLE NUMBER	SAMPLE TYPE	PARAMETER OF INTEREST							
		Nitrite	Nitrate	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
699-52-57-001	soil	< 0.5 mg/Kg	2.9 mg/Kg (UJ)	< 3.0 mg/Kg	< 6.0 mg/Kg	0 (R)	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	< 0.2 mg/Kg (UJ)
699-52-57-027	soil	< 0.5 mg/Kg	1.6 mg/Kg	< 3.0 mg/Kg	22.7 mg/Kg	0 (J)	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	< 0.2 mg/Kg (UJ)
699-52-57-049 (equipment blank)	water	< 5.0 µg/L	< 5.0 µg/L	< 31.0 µg/L	< 55.0 µg/L	0.4 µg/L (J)	< 3.75 µg/L	< 7.25 µg/L	NR
699-52-57-050	soil	< 0.5 mg/Kg	1.2 mg/Kg	< 3.0 mg/Kg	19.7 mg/Kg	0.6 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	NR
699-52-57-050A (ambient field blank)	water	< 5.0 µg/L	< 5.0 µg/L	< 31.0 µg/L	< 55.0 µg/L	0.9 µg/L (J)	< 3.75 µg/L	< 7.25 µg/L	NR
699-52-57-074 (equipment blank)	water	< 5.0 µg/L (UJ)	56.2 µg/L (J)	< 31.0 µg/L (UJ)	< 55.0 µg/L	0.1 µg/L (J)	< 3.75 µg/L	< 7.25 µg/L	NR
699-52-57-077	soil	< 0.5 mg/Kg	1.0 mg/kg	< 3.0 mg/Kg	15.0 mg/Kg	0.1 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	NR
699-52-57-077A (ambient field blank)	water	< 5.0 µg/L (UJ)	< 5.0 µg/L (UJ)	< 31.0 µg/L (UJ)	< 55.0 µg/L	0.1 µg/L (J)	< 3.75 µg/L	< 7.25 µg/L	NR
699-52-57-077-B (duplicate sample)	soil	< 0.5mg/Kg	0.9 mg/Kg	< 3.0 mg/Kg	13.3 mg/Kg	0.1 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	NR
699-52-57-101.5	soil	< 0.2 mg/Kg	0.4 mg/Kg	< 0.6 mg/Kg	5.4 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-52-57-125 (trip blank)	water	< 14.9 µg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 1.0 µg/L	< 3.75 µg/L	< 7.25 µg/L	NR
699-52-57-128	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	4.4 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-52-57-153	soil	< 0.2 mg/Kg	< 0.2 mg/Kg	< 0.6 mg/Kg	4.9 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR



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## WELL 699-55-55 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE NUMBER	SAMPLE TYPE	PARAMETER OF INTEREST							
		Nitrite	Nitrate	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
699-55-55-001	soil	< 0.5 mg/Kg	< 0.5 mg/Kg	< 3.0 mg/Kg	< 6.0 mg/Kg	0.1 mg/Kg	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	< 0.2 mg/Kg (UJ)
699-55-55-025	soil	< 0.5 mg/Kg	1.2 mg/Kg	< 3.0 mg/Kg	17.2 mg/Kg	0 (J)	< 0.5 mg/Kg (UJ)	< 10.0 mg/Kg	< 0.2 mg/Kg (UJ)
699-55-55-048 (equipment blank)	water	< 14.9 µg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	1.5 µg/L (J)	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-050	soil	< 0.2 mg/Kg	0.4 mg/Kg	< 0.6 mg/Kg	8.2 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-050A (ambient field blank)	water	< 14.9 µg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 1.0 µg/L (UJ)	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-073 (equipment blank)	water	< 14.9 µg/L (UJ)	35.9 µg/L (U)	< 60.0 µg/L	< 250.0 µg/L	< 1.0 µg/L (UJ)	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-075	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	17.8 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-075A (ambient field blank)	water	< 14.9 µg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 1.0 µg/L (UJ)	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-098 (trip blank)	water	< 14.9 µg/L	31.6 µg/L (U)	< 60.0 µg/L	< 250.0 µg/L	< 1.0 µg/L	< 3.75 µg/L	< 7.25 µg/L	NR
699-55-55-101	soil	< 0.2 mg/Kg	0.8 mg/Kg	< 0.6 mg/Kg	15.2 mg/Kg	0.1 mg/Kg (J)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-125	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	21.3 mg/Kg	0.1 mg/Kg (U)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-125A (duplicate sample)	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	16.1 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR
699-55-55-150	soil	< 0.2 mg/Kg	0.5 mg/Kg	< 0.6 mg/Kg	26.7 mg/Kg	< 0.1 mg/Kg (UJ)	< 0.3 mg/Kg (UJ)	< 0.1 mg/Kg (UJ)	NR

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WELL 299-E33-38 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE NUMBER	SAMPLE TYPE	PARAMETER OF INTEREST							
		Nitrite	Nitrate	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
299-E33-38-006.2	soil	< 0.2 mg/Kg	0.6 mg/Kg	< 0.6 mg/Kg	6.3 mg/Kg	< 0.1 mg/Kg	< 1.3 µg/L (UJ)	< 4.3 µg/L (UJ)	NR

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## WELL 299-E33-40 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE NUMBER	SAMPLE TYPE	PARAMETER OF INTEREST							
		Nitrite	Nitrate	Phosphate	Sulfate	Total Cyanide	Selenium	Bismuth	Free Cyanide
299-E33-40-008	soil	< 0.2 mg/Kg	0.9 mg/Kg	< 0.6 mg/Kg	15.0 mg/Kg	< 0.1 mg/Kg (UJ)	< 1.3 µg/L (UJ)	< 4.3 µg/L (UJ)	NR
299-E33-40-200 (trip blank)	water	< 14.9 µg/L	27.1 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 10.0 µg/L	< 5.0 µg/L	< 10.0 µg/L	NR
299-E33-40-201 (equipment blank)	water	< 14.9 µg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 10.0 µg/L	< 5.0 µg/L	< 10.0 µg/L	NR
299-E33-40-201A	water	< 14.9 µg/L	< 14.9 µg/L	< 60.0 µg/L	< 250.0 µg/L	< 10.0 µg/L	< 5.0 µg/L	< 10.0 µg/L	NR
299-E33-40-201.7	soil	< 2.0 mg/Kg	8.2 mg/Kg	< 6.0 mg/Kg	98.4 mg/Kg	< 1.0 mg/Kg (UJ)	< 5.0 mg/Kg (R)	< 1.0 mg/Kg (UJ)	NR
299-E33-40-201.7A (duplicate sample)	soil	< 2.0 mg/Kg	7.8 mg/Kg	< 6.0 mg/Kg	76.3 mg/Kg (J)	< 1.0 mg/Kg	< 5.0 mg/Kg (R)	< 1.0 mg/Kg (UJ)	NR

10-400010

10-400010

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## TOTAL ORGANIC CARBON SAMPLES - WELL 699-52-57

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-52-57-157A	water (trip blank)	0.41 µg/ml	10/23/90	10/26/90
699-52-57-157B	water (equipment blank)	0.99 µg/ml	10/23/90	10/26/90
699-52-57-160A	water (ambient field blank)	0.65 µg/ml	10/23/90	10/26/90
699-52-57-160	soil	61.0 mg/Kg	10/23/90	10/26/90
699-52-57-160B	soil (duplicate sample)	84.1 mg/Kg	10/23/90	10/26/90
699-52-57-162.0	soil	47.9 mg/Kg	10/26/90	11/13/90

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## TOTAL ORGANIC CARBON SAMPLES - WELL 699-50-53B

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-50-53B-EB	soil	94 $\mu\text{g/g}$ (J)	04/25/90	05/01/90
699-50-53B-155.7	soil (duplicate sample)	43 $\mu\text{g/g}$ (J)	04/25/90	05/01/90
699-50-53B-208	soil	22.6 mg/Kg (J)	10/10/90	04/27/90
699-50-53B-208A	soil (duplicate sample)	26.5 mg/Kg	10/10/90	04/30/90
699-50-53B-214	soil	14.1 mg/Kg	10/11/90	10/16/90
699-50-53B-225	soil	56.6 mg/Kg (R)	10/12/90	10/16/90

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## TOTAL ORGANIC CARBON SAMPLES - WELL 699-48-50

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-48-50-168-1	soil	176 µg/g	05/03/90	05/15/90
699-48-50-168-2	soil (duplicate sample)	131 µg/g	05/03/90	05/15/90
699-48-50-176	soil	149 µg/g	05/04/90	05/16/90
699-48-50-176.7	soil	221 µg/g	05/04/90	05/16/90

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	area (699 = 600 Area) (299 = 200 Area)		well number		depth of sample	duplicate, equipment blank, field blank, or trip blank

## TOTAL ORGANIC CARBON SAMPLES - WELL 699-49-57B

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-49-57B-157.5	soil	173 µg/g (J)	04/24/90	04/27/90
699-49-57B-157.5D	soil (duplicate sample)	95 µg/g (J)	04/24/90	04/27/90
699-49-57B-160	soil	69 µg/g (J)	04/24/90	04/27/90
699-49-57B-161	soil	113 µg/g	04/24/90	04/30/90
699-49-57B-216	soil	96.0 mg/Kg (J)	10/01/90	10/16/90
699-49-57B-216A	soil (duplicate sample)	52.2 mg/Kg (J)	10/01/90	10/16/90
699-49-57B-216B	water (field blank)	0.67 µg/ml (J)	10/01/90	10/24/90
699-49-57B-216C	water (trip blank)	0.40 µg/ml (J)	10/01/90	10/24/90
699-49-57B-216D	water (equipment blank)	0.16 µg/ml (J)	10/02/90	10/24/90
699-49-57B-220	soil	39.0 mg/Kg (J)	10/02/90	10/17/90
699-49-57B-229	soil	50.0 mg/Kg (J)	10/08/90	10/18/90
699-49-57B-229A	raw water	1.34 µg/ml (J)	10/08/90	10/25/90



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	area (699 = 600 Area) (299 = 200 Area)		well number		depth of sample	duplicate, equipment blank, field blank, or trip blank

## TOTAL ORGANIC CARBON SAMPLES - WELL 699-52-54

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-52-54-168.5	soil	280 µg/g	05/22/90	05/30/90

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## TOTAL ORGANIC CARBON SAMPLES - WELL 699-55-55

SAMPLE NUMBER	SAMPLE MEDIUM	TOTAL ORGANIC CARBON	DATE COLLECTED	DATE ANALYZED
699-55-55-160	soil	92.3 mg/Kg	10/23/90	10/26/90
699-55-55-160A	soil (duplicate sample)	125 mg/Kg	10/23/90	10/26/90
699-55-55-162	soil	21.5 mg/Kg (J)	10/23/90	10/26/90
699-55-55-166	soil	61.5 mg/Kg	10/24/90	10/26/90
699-55-55-190	soil	23.8 mg/Kg	10/29/90	11/13/90

Attachment 3

Summary of Parameters of Interest Data by Data Package

01123456789

0112010244

NR	not required and/or requested
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SAMPLE IDENTIFICATION KEY	<u>699</u>	-	<u>52 - 57</u>	-	<u>049</u>	<u>A, B, C, etc.</u>
	area		well number		depth of sample	duplicate, equipment blank, field blank, or trip blank
	(699 = 600 Area) (299 = 200 Area)					

## DATA PACKAGE #1 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (mg/kg)	Bismuth (mg/kg)	Free Cyanide (mg/kg)
Detectable Limit (DL)	0.5	0.5	3.0	6.0	0.1-0.4	0.5 *	10.0 *	0.2
699-52-57-001	< DL	2.9 (UJ)	< DL	< DL	0 (R)	< DL (UJ)	< DL	< 0.2 (UJ)
699-55-55-001	< DL	< DL	< DL	< DL	0.1	< DL (UJ)	< DL	< 0.2 (UJ)
699-52-57-027	< DL	1.6	< DL	22.7	0 (J)	< DL (UJ)	< DL	< 0.2 (UJ)
699-55-55-025	< DL	1.2	< DL	17.2	0 (J)	< DL (UJ)	< DL	< 0.2 (UJ)
699-52-57-050	< DL	1.2	< DL	19.7	0.6	< DL (UJ)	< DL	NR
699-52-57-077	< DL	1.0	< DL	15.0	0.1	< DL (UJ)	< DL	NR
699-52-57-077-B **	< DL	0.9	< DL	13.3	0.1	< DL (UJ)	< DL	NR

\* Contract Required Detection Limit  
 \*\* Duplicate Sample

## 145

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**DATA PACKAGE #1 - PARAMETERS OF INTEREST- WATER SAMPLES**

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (µg/L)	Nitrate (µg/L)	Phosphate (µg/L)	Sulfate (µg/L)	Total Cyanide (µg/L)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (µg/L)
Detectable Limit (DL)	5.0	5.0	31.0	55.0	1.0	3.75	7.25	
699-52-57-049 (Equipment Blank)	< DL	< DL	< DL	< DL	0.4 (J)	< DL	< DL	NR
699-52-57-050A (Ambient Field Blank)	< DL	< DL	< DL	< DL	0.9 (J)	< DL	< DL	NR
699-52-57-074 (Equipment Blank)	< DL (UJ)	56.2 (J)	< DL (UJ)	< DL	0.1 (J)	< DL	< DL	NR
699-52-57-077A (Ambient Field Blank)	< DL (UJ)	< DL (UJ)	< DL (UJ)	< DL	0.1 (J)	< DL	< DL	NR

\* Contract Required Detection Limit

U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).

UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R The data are unusable.

SAMPLE IDENTIFICATION KEY	<u>699</u>	-	<u>52 - 57</u>	-	<u>049</u>	<u>A, B, C, etc.</u>
	area		well number		depth of sample	duplicate, equipment blank, field blank, or trip blank
	(699 = 600 Area)					
	(299 = 200 Area)					

**DATA PACKAGE #2 - PARAMETERS OF INTEREST- SOIL SAMPLES**

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (mg/kg)	Bismuth (mg/kg)	Free Cyanide (mg/kg)
Detectable Limit (DL)	0.2	0.2	0.6	3.8	0.1-0.4	0.3 *	0.1 *	N/A
699-55-55-050	< DL	0.4	< DL	8.2	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-55-55-075	< DL	0.5	< DL	17.8	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-52-57-101.5	< DL	0.4	< DL	5.4	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-55-55-101	< DL	0.8	< DL	15.2	0.1 (J)	< DL (UJ)	< DL (UJ)	NR
699-55-55-125	< DL	0.5	< DL	21.3	0.1 (U)	< DL (UJ)	< DL (UJ)	NR
699-55-55-125A **	< DL	0.5	< DL	16.1	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-52-57-128	< DL	0.5	< DL	4.4	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-52-57-153	< DL	< DL	< DL	4.9	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR
699-55-55-150	< DL	0.5	< DL	26.7	< DL (UJ)	< DL (UJ)	< DL (UJ)	NR

\* Instrument Detection Limit  
\*\* Duplicate Sample

R The data are unusable.

## DATA PACKAGE #2 - PARAMETERS OF INTEREST- WATER SAMPLES

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (µg/L)	Nitrate (µg/L)	Phosphate (µg/L)	Sulfate (µg/L)	Total Cyanide (µg/L)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (µg/L)
Detectable Limit (DL)	14.9	14.9	60.0	250.0	1.0	3.75	7.25	
699-55-55-048 (Equipment Blank)	< DL	< DL	< DL	< DL	1.5 (J)	< DL	< DL	NR
699-55-55-050A (Field Blank)	< DL	< DL	< DL	< DL	< DL (UJ)	< DL	< DL	NR
699-55-55-073 (Equipment Blank)	< DL	35.9 (U)	< DL	< DL	< DL (UJ)	< DL	< DL	NR
699-55-55-075A (Field Blank)	< DL	< DL	< DL	< DL	< DL (UJ)	< DL	< DL	NR
699-55-55-098 (Trip Blank)	< DL	31.6 (U)	< DL	< DL	< DL	< DL	< DL	NR
699-52-57-125 (Trip Blank)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	NR

\* Contract Required Detection Limit

11-2-3-4-5

U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).

UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R The data are unusable.

SAMPLE IDENTIFICATION KEY	<u>699</u>	-	<u>52 - 57</u>	-	<u>049</u>	<u>A, B, C, etc.</u>
	area		well number		depth of sample	duplicate, equipment blank, field blank, or trip blank
	(699 = 600 Area) (299 = 200 Area)					

### DATA PACKAGE #3 - PARAMETERS OF INTEREST- SOIL SAMPLES

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (mg/kg)
Detectable Limit (DL)	0.2	0.2	0.6	3.7	0.1-0.4	1.3 *	4.3 *	
299-E33-38-006.2	< 0.2	0.6	< 0.6	6.3	< 0.1	< 1.3 (UJ)	< 4.3 (UJ)	NR
299-E33-40-008	< 0.2	0.9	< 0.6	15.0	< 0.1 (UJ)	< 1.3 (UJ)	< 4.3 (UJ)	NR

\* Instrument Detection Limit



R The data are unusable.

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (mg/kg)	Nitrate (mg/kg)	Phosphate (mg/kg)	Sulfate (mg/kg)	Total Cyanide (mg/kg)	Selenium (mg/kg)	Bismuth (mg/kg)	Free Cyanide (mg/kg)
Detectable Limit (DL)	2.0	2.0	6.0	34	1.0	0.5 *	10.0 *	
299-E33-40-201.7	< 2.0	8.2	< 6.0	98.4	< 1.0 (UJ)	< 5.0 (R)	< 1.0 (UJ)	NR
299-E33-40-201.7A **	< 2.0	7.8	< 6.0	76.3 (J)	< 1.0	< 5.0 (R)	< 1.0 (UJ)	NR

\* Contract Required Detection Limit  
\*\* Duplicate Sample

0 1 1 2 3 4 5 0

NR not required and/or requested

U The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).

J The associated value is an estimated quantity.

UJ The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R The data are unusable.

SAMPLE IDENTIFICATION KEY	<u>699</u>	-	<u>52 - 57</u>	-	<u>049</u>	<u>A, B, C, etc.</u>
	area (699 = 600 Area) (299 = 200 Area)		well number		depth of sample	duplicate, equipment blank, field blank, or trip blank

#### DATA PACKAGE #4 - PARAMETERS OF INTEREST- WATER SAMPLES

SAMPLE NUMBER	PARAMETER OF INTEREST							
	Nitrite (µg/L)	Nitrate (µg/L)	Phosphate (µg/L)	Sulfate (µg/L)	Total Cyanide (µg/L)	Selenium (µg/L)	Bismuth (µg/L)	Free Cyanide (µg/L)
Detectable Limit (DL)	14.9	14.9	60.0	250.0	10.0 *	5.0 *	60.0 *	
299-E33-40-200 (Trip Blank)	< 14.9	27.1	< 60	< 250	< 10	< 5	< 10	NR
299-E33-40-201 (Equipment Blank)	< 14.9	< 14.9	< 60	< 250	< 10	< 5	< 10	NR
299-E33-40-201A (Ambient Blank)	< 14.9	< 14.9	< 60	< 250	< 10	< 5	< 10	NR

\* Contract Required Detection Limit

Attachment 4

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 1

15061005  
011116

00-BP-1 SUMMARY TABLE

laboratory: PNL-325

DG #: Report 1, Rev 0

PARAMETERS OF INTEREST - water  
sample value/qualifier

Parameter	DL (ppb)	52-57-049	52-57-050A	52-57-074	55-57-077A
=====					
ANIONS (ppb)					
-----					
nitrite	5	<DL	<DL	<DL UJ	<DL UJ
nitrate	5	<DL	<DL	56.2 J	<DL UJ
phosphate	31	<DL	<DL	<DL UJ	<DL UJ
sulfate	55	<DL	<DL	<DL	<DL
AN (ppb)					
-----					
total	1	0.4 J	0.9 J	0.1 J	0.1 J
free		NR	NR	NR	NR
GFAA (ppb)					
-----					
Se	3.75	<DL	<DL	<DL	<DL
Bi	7.25	<DL	<DL	<DL	<DL

R not reported and/or requested

11 sample numbers begin with 699- prefix

0-BP-1 SUMMARY TABLE

laboratory: PNL-325

FIG #: Report 1, Rev 0

PARAMETERS OF INTEREST - soil

sample value/qualifier

Parameter	DL	52-57-001	55-55-001	52-57-027	55-55-025	55-57-050	52-57-077	52-57-077-8
=====								
ANIONS (ppm)								
nitrite	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
nitrate	0.5	2.9 UJ	<DL	1.6	1.2	1.2	1.0	0.9
phosphate	3	<DL	<DL	<DL	<DL	<DL	<DL	<DL
sulfate	6	<DL	<DL	22.7	17.2	19.7	15	13.3
=====								
AMMONIA (ppm)								
total	0.1-0.4	0 R	0.1	0 J	0 J	0.6	0.1	0.1
free	0.2	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	NR	NR	NR
=====								
HEAVY METALS (ppb)								
Se	3.75	<DL UJ	<DL UJ	<DL UJ	<DL UJ	<DL UJ	<DL UJ	<DL UJ
Bi	7.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL

{ not reported and/or requested

l sample numbers begin with 699- prefix

200-BP-1 DATA QUALIFIER DEFINITIONS

---

- U      The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J      The associated value is an estimated quantity.
- UJ     The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R      The data are unusable.

4  
5  
0  
0  
1  
1  
2  
1  
1  
2  
3



Westinghouse  
Hanford Company

# OSH RCRA LEVEL C DATA ASSESSMENT

DATE 12/5/90

SAMPLES/MATRIX 699-52-57-001 699-52-57-050A

REVIEWED BY DA Lerch

699-55-55-001 699-52-57-077

LABORATORY PNL

699-52-57-027 699-52-57-078

CASE # PNL project #16772

699-55-55-025 699-52-57-074

SDG # N/A

699-52-57-050 699-52-57-071A

699-52-57-049

## DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	% Solids	Anion	CN (Total)
1. <u>Holding Time</u>	<u>N/A</u>	<u>X</u>	<u>X</u>	
2. <u>Blank Analysis</u>	<u>N/A</u>	<u>X</u>	<u>X</u>	
3. <u>MS/MSD</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	
4. <u>Duplicate Analysis</u>	<u>O</u>	<u>X</u>	<u>O</u>	
5. <u>Matrix Spike</u>	<u>N/A</u>	<u>O</u>	<u>O</u>	
6. <u>Calibrations/Control Stds</u>	<u>N/A</u>	<u>O</u>	<u>M</u>	
7. <u>Other QC</u>	<u>N/A</u>	<u>See Attachment</u>		
8. _____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____

O = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: CN result unusable (R) due to low LCS recovery on 699-52-57-001; all other results acceptable w/qualification

NOTES: See "Other QC" for cross ref. sample #'s & matrix

o Refer to the corresponding attachments for explanation of any problems.



Westinghouse  
Hanford Company

### OSM RCRA LEVEL C DATA ASSESSMENT

DATE 12/5/90 SAMPLES/MATRIX \_\_\_\_\_  
REVIEWED BY JA Lerch See Page \_\_\_\_\_  
LABORATORY PNL \_\_\_\_\_  
CASE # PNL project #16772 \_\_\_\_\_  
SDG # N/A \_\_\_\_\_

#### DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	GFAA	CN (free)
1. <u>Holding time</u>	<u>O</u>	<u>O</u>	
2. <u>Blank Analysis</u>	<u>O</u>	<u>O</u>	
3. <u>MS/MSD</u>	<u>O</u>	<u>N/A</u>	
4. <u>Duplicate Analysis</u>	<u>O</u>	<u>O</u>	
5. <u>Matrix Spike</u>	<u>X</u>	<u>X</u>	
6. <u>Calibration/Control Std</u>	<u>O</u>	<u>O</u>	
7. <u>Other QC</u>	<u>see attachment</u>		
8. _____	_____	_____	
9. _____	_____	_____	
10. _____	_____	_____	

O = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: see page 1

NOTES: analytical spikes

o Refer to the corresponding attachments for explanation of any problems.



RCRA LEVEL C QC

Name JA Lerch / 12 Date 12/5/90

QC Check: Holding times

COMMENTS: 70 solids - Holding time N/A, all samples (soil) analyzed within 23 days

Anions - nitrate, nitrite, phosphate HT's exceeded for samples 699-52-57-074 and ~~699-52-57-077A~~ 699-52-57-077A

~~ANIONS~~: CN(total) - 14 day holding time exceeded on several water + soil samples (see below)

ACTION: Qualify associated results as per OSM guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
699-52-57-074	Nitrate	UJ
	Nitrite	UJ
	Phosphate	UJ
699-52-57-077A	Nitrate	UJ
	Nitrite	UJ
	Phosphate	UJ
699-52-57-027	CN(total)	UJ
699-55-55-025		UJ
699-52-57-049		UJ
699-52-57-050A		UJ
699-52-57-074		UJ
699-52-57-077A		UJ

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------

RCRA LEVEL C QC

Name JA Lerch Date 12/5/90

QC Check: Holding times (cont)

COMMENTS: GFAA - all elements analyzed within 6mo HT  
Free CN - all samples analyzed within Holding time

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch Date 12/5/90

QC Check: Blank Analysis

COMMENTS: 7. solids - N/A 12/5/90

Anions - trace contam. of Nitrate blank for 699-52-57-001  
all other blanks free of contamination

CN - trace contamination on 699-52-57-001; other detections

observed below listed DL's - no qualification based on sample results

ACTION: qualify associated results as per OSM  
guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
699-52-57-001	CN	acceptable			
	Nitrate	2.9 u			

RCRA LEVEL C QC

Name JA Lerch *JA* Date 12/5/90

QC Check: Blank Analysis (cont)

COMMENTS: GFAA - all procedure & continuing cal. blanks  
free of contamination

Free CN - free CN blank Free of contamination

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch Date 10/05/90

QC Check: MS/MSD

COMMENTS: GFAA- MS, MSD recoveries and associated  
RPD's acceptable for Se, Bi analysis

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

RCRA LEVEL C QC

Name JA Lerch Date 12/5/90

QC Check: Duplicate analysis

COMMENTS: 7. solid - all duplicate RPD's ok

Anions - Nitrate RPD 26% for 699-52-57-001; all other  
RPD's ok or N/A

CN - all CN duplicate RPD's ok

ACTION: qualify associated results as per  
OSM guidelines

sample # constituent value/qual

sample # constituent value/qual

699-52-57-001 Nitrate 2.9 UJ

RCRA LEVEL C QC

Name JA Lerch / Date 12/5/90

QC Check: Duplicate analysis (cont)

COMMENTS: GFAA - see MS/MSD QC

Free CN - duplicate RPD N/A both sample + Dup < DL

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch Date 12/5/90

QC Check: Matrix spike

COMMENTS: % solids - N/A

Anions - all spike %R within 75-125 % no problems

CN - all recoveries within 93-116 % no problems

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name JA Lerch / J Date 12/5/90

QC Check: Matrix Spike (cont)

COMMENTS: GFAA (analytical spikes) - all Bismuth analytical  
spike %R within limits, all se. water analytical spikes  
ok; Several Se soil recoveries out of control (see below)

Free CN - spike recovery low

ACTION: qualify associated results as per  
OSM guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
9-52-57-001	Se	UJ
699-55-55-001	Se	UJ
79-52-57-027	Se	UJ
699-55-55-025	Se	UJ
699-55-57-050	Se	UJ
699-52-57-077	Se	UJ
699-52-57-078	Se	UJ
699-52-55-001	Free CN	UJ
699-55-55-001		
699-52-57-027		
699-55-55-025		

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
/		

RCRA LEVEL C QC

Name JA Lerch Date 12/5/90

QC Check: Calibrations/Control Samples

COMMENTS: % Solids - N/A

Anions - all verification std + LCS recoveries ok

CN - calibration recoveries ok; LCS recovery very low (<4%)  
for 699-52-57-001, all other LCS %R ok

ACTION: qualify associated results as per  
OSM-qualif guidelines

sample # constituent value/qual

699-52-57-001 CN R  
due to very low recovery

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch 12 Date 12/5/90

QC Check: Calibrations/Control Samples (cont)

COMMENTS: GFAA - all initial & continuing cal. verification  
70R, control std recovery ok  
Free CN - control std recoveries acceptable

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

RCRA LEVEL C QC

Name JA Lerch Date 12/05/90

QC Check: Other

COMMENTS: Free CN run on only four samples (1st four listed on data assessment cover sheet)

Several results for CN reported less than detection limit with no flag

ACTION: qualify a CN results reported < DL as estimated (J)

sample # constituent value/qual

sample #	constituent	value/qual
699-52-57-001	CN	0 J
699-52-55-001		0 J
699-52-57-027		0 J
699-55-55-025		0.4 J
699-52-57-049		0.9 J
699-52-57-050A		0.1 J
699-52-57-074		0.1 J
699-52-57-077A		

sample # constituent value/qual

Sample Cross Reference

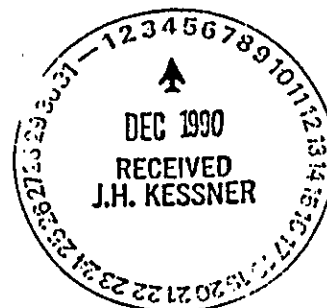
WHC	PNL	matrix
699-52-57-001	90-5335	Soil
699-52-55-001	90-5336	Soil
699-52-57-027	90-5343	Soil
699-55-55-025	90-5344	Soil
699-55-57-050	90-5345	Soil
699-52-57-077	90-5350	Soil
699-52-57-077B	90-5351	Soil
699-52-57-049	90-5346	water
699-52-57-050A	90-5347	water
699-52-57-074	90-5352	water
699-52-57-077A	90-5353	water

**200-BP-1  
GROUNDWATER ANALYSIS PROJECT**

**PARAMETERS OF INTEREST  
DATA PACKAGE/REPORT No. 1**

**Revision 0**

**December 3, 1990**



**Prepared by: B.M. Gillespie**

**Pacific Northwest Laboratory**

**(PNL Project #16772)**

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## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 17662 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, uranium activity, and tritium. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are include in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 15) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie  
B. M. Gillespie  
200-BP-1 Project Manager

12-3-90  
Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjp ALO-001.

J. L. Daniel  
J. L. Daniel  
PNL ACL Quality Representative

12/3/90  
Date

Table 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>
699-52-57-001	90-5335
699-55-55-001	90-5336
699-52-57-027	90-5343
699-55-55-025	90-5344
699-52-57-050	90-5345
699-52-57-049	90-5346
699-52-57-050A	90-5347
699-52-57-077	90-5350
699-52-57-077B	90-5351
699-52-57-074	90-5352
699-52-57-077A	90-5353

# INORGANIC DATA TABLES

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### ANION ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. The sample solution was then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis was performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte.

The mean % spike recoveries and their standard deviations (SD) are as follows:

	<u>SAMPLE + SPIKE</u>				<u>BLANK + SPIKE</u>	
	<u>SOILS</u>		<u>WATER</u>		<u>SOIL AND WATER</u>	
	<u>(% REC)</u>	<u>SD (%)</u>	<u>(% REC)</u>	<u>SD (%)</u>	<u>(% REC)</u>	<u>SD (%)</u>
NO2-N	94.7	7.1	116.7	5.4	95.0	16.4
NO3-N	100.5	2.6	104.0	2.2	98.9	1.8
PO4-P	90.0	7.0	99.2	2.0	92.3	4.9
S04	99.1	3.7	103.3	2.8	100.5	0.5

Upon review of the nitrate and sulfate soil analysis of duplicates a mean and standard deviation of the RPD's of the duplicate values are:

	<u>Mean (%)</u>	<u>Std dev (%)</u>
NO3-N	7.8	10.8
S04	2.9	3.2

The values varied due to heterogeneity of sample matrix. The concentration of the other soil analytes and all analytes for water samples, was below the detection limits, therefore a relative percent difference is not calculated.

The hold times for water analysis of anions is 48 hours from sampling to the time of analysis. Hold times on water samples were met on two water samples and missed on the other two due to facilities maintenance. Since the hold times were only missed by 4.3 hours and 3.5 hours, there is no impact on the results. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

TABLE 3: ANION IC ANALYSIS DATA

## NITRITE

## SOLID SAMPLES

											% RECOVERIES		
SAMPLE ID#	PHL LOG#	C1	C2	RPD	C5	C3		C6		C3	C6	C4	
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE SAMPLE (mg/Kg)	SPIKE (mg/Kg)	BLANK SPIKE (mg/Kg)	SPIKE (mg/Kg)	SAMPLE + SPIKE	BLANK SPIKE	LSC SAMPLE	
699-52-57-001	90-5335	<DL	<DL	NA	<DL	60.9	61.8	57.3	58.1	98.5	98.6	99.3	
	90-5335R	<DL	<DL	NA	<DL	21.4	21.7			98.6		102.6	
699-52-55-001	90-5336	<DL	<DL	NA	<DL	78.1	80.5	72.9	71.6	80.5	71.6	99.3	
	90-5336R	<DL	<DL	NA	<DL	22.5	23.4			96.2		98.0	
699-52-57-027	90-5343	<DL	<DL	NA	<DL	23.1	24.9			92.8		97.4	
												100.7	
699-55-55-025	90-5344	<DL	<DL	NA	<DL	27.5	29.3			93.6		103.9	
												101.3	
699-55-57-050	90-5345	<DL						23.7	23.7	102.6	100.0	101.3	
699-52-57-077	90-5350	<DL											
699-52-57-077-B	90-5351	<DL	<DL	NA	<DL	24.0	23.4						
*DL = detection limit of 0.5 mg/Kg (theoretical)													
											mean	94.7	
											std. dev.	7.1	

\*DL = detection limit of 0.5 mg/Kg (theoretical)

## WATER SAMPLES

										% RECOVERIES		
SAMPLE ID#	PHL LOG#	C1	C2	RPO	C5	C3		C6		C3	C6	C6
		SAMPLE	SAMPLE DUP		BLANK	SPIKE SAMPLE	SPIKE	BLANK SPIKE	SPIKE	SAMPLE + SPIKE	BLANK SPIKE	LSC SAMPLE
		(ug/L)	(ug/L)		(ug)	(ug/L)	(ug/L)	(ug/L)	(ug/L)			
699-52-57-049	90-5346	<DL	<DL	NA								
699-52-57-050A	90-5347	<DL	<DL	NA	<DL	1620.0	1520.0	1670.0	1520.0	110.5	109.9	102.6
699-52-57-074	90-5352 (a)	<DL	UJ	NA		1810.0	1520.0			119.1		
699-52-57-077A	90-5353 (b)	<DL	UJ	NA		1830.0	1520.0			120.4		
mean										116.7	95.0	100.3
std. dev.										5.6	16.6	2.1

\*DL = detection limit of 5 ug/L

Note: RPD only calculated when results are &gt;DL.

(a) Hold time missed by 4.3 hrs.

(b) Hold time missed by 3.5 hrs.

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TABLE 3: ANION IC ANALYSIS DATA

## NITRATE

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	RPD	C5 BLANK (ug)	C3 SPIKE SAMPLE (mg/Kg)	SPIKE (mg/Kg)	C6 BLANK SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE % REC.	C6 BLANK SPIKE % REC.	C4 LSC SAMPLE % REC.
699-52-57-001	90-5335	2.9	2.3	26.2	1.7	46.4	45.9	44.5	43.1	95.4	97.2	99.1
	90-5335R	1.6	1.6	0	<DL	18.0	16.1			102.0		100.9
699-52-55-001	90-5336	<DL	<DL	NA	<DL	60.2	59.8	53	53.1	100.7	99.8	101.8
	90-5336R	0.4	0.5	8.7	<DL	17.9	17.3			100.8		100.9
699-52-57-027	90-5343	1.6	1.6	1.2	<DL	20.3	18.5			100.9		102.7
699-55-55-025	90-5344	1.2	1.2	1.6	<DL	23.8	21.7			104.0		100.0
699-55-57-050	90-5345	1.2										100.9
699-52-57-077	90-5350	1.0										101.8
699-52-57-077-B	90-5351	0.9	0.9	1.1	<DL	18.3	17.4	18.1	17.6	99.9	97.6	99.1
										mean	100.5	
										std. dev.	2.6	

\*DL = detection limit of 0.5 mg/Kg (theoretical)

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (ug/L)	C2 SAMPLE DUP (ug/L)	RPD	C5 BLANK (ug)	C3 SPIKE SAMPLE (ug/L)	SPIKE (ug/L)	C6 BLANK SPIKE (ug/L)	SPIKE (ug/L)	% RECOVERIES		
										C3 SAMPLE + SPIKE	C6 BLANK SPIKE	C4 LSC SAMPLE
699-52-57-049	90-5346	<DL	<DL	NA								
699-52-57-050A	90-5347	<DL	<DL	NA	<DL	1140.0	1120.0	1140.0	1130.0	101.8	100.9	100.0
699-52-57-074	90-5352 (a)	56.2	56.2	0		1230.0	1130.0			103.9		
699-52-57-077A	90-5353 (b)	<DL	<DL	NA		1200.0	1130.0			106.2		
										mean	104.0	98.9
										std. dev.	2.2	1.8
												100.6

\*DL = detection limit of 5 ug/L

Note: RPD only calculated when results are &gt;DL.

(a) Hold time missed by 4.3 hrs.

(b) Hold time missed by 3.5 hrs.

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TABLE 3: ANION IC ANALYSIS DATA

## PHOSPHATE

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	RPD	C5 BLANK (ug)	C3		C6		C3 SAMPLE + SPIKE	% RECOVERIES	
						SPIKE SAMPLE (mg/Kg)	SPIKE (mg/Kg)	BLANK SPIKE (mg/Kg)	SPIKE (mg/Kg)		C6 BLANK SPIKE	C4 LSC SAMPLE
699-52-57-001	90-5335	<DL	<DL	NA	<DL	59.8	66.2	57	62.2	90.3	91.6	88.3
	90-5335R	<DL	<DL	NA	<DL	23.2	23.2			100.0		96.9
699-52-55-001	90-5336	<DL	<DL	NA	<DL	78.1	86.3	71.5	76.7	90.5	93.2	92.0
	90-5336R	1.2	<DL	NA	<DL	25.1	25.0			98.0		90.8
699-52-57-027	90-5343	<DL	<DL	NA	<DL	23.0	26.7			86.1		93.9
699-55-55-025	90-5344	<DL	<DL	NA	<DL	25.6	31.4			81.5		95.1
699-55-57-050	90-5345	<DL										92.6
699-52-57-077	90-5350	<DL										93.9
699-52-57-077-B	90-5351	<DL	<DL	NA	<DL	20.9	25.1	21.8	25.3	83.3	86.2	92.6
										mean	90.0	
										std. dev.	7.0	

\*DL = detection limit of 3 mg/Kg (theoretical)

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (ug/L)	C2 SAMPLE DUP (ug/L)	RPD	C5 BLANK (ug)	C3		C6		C3 SAMPLE + SPIKE	% RECOVERIES	
						SPIKE SAMPLE (ug/L)	SPIKE (ug/L)	BLANK SPIKE (ug/L)	SPIKE (ug/L)		C6 BLANK SPIKE	C4 LSC SAMPLE
699-52-57-069	90-5346	<DL	<DL	NA								
699-52-57-050A	90-5347	<DL	<DL	NA	<DL	1570.0	1620.0	1600.0	1630.0	96.9	98.2	98.2
699-52-57-076	90-5352 (a)	<DL	<DL	NA		1640.0	1630.0			100.6		
699-52-57-077A	90-5353 (b)	<DL	<DL	NA		1630.0	1630.0			100.0		
										mean	99.2	93.5
										std. dev.	2.0	2.6

\*DL = detection limit of 31 ug/L

Note: RPD only calculated when results are &gt;DL.

(a) Hold time missed by 4.3 hrs.

(b) Hold time missed by 3.5 hrs.

  
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TABLE 3: ANION IC ANALYSIS DATA

SULFATE

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE SAMPLE (mg/Kg)	SPIKE (mg/Kg)	BLANK SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 BLANK SPIKE	C4 LSC SAMPLE
699-52-57-001	90-5335	<DL	<DL	NA	<DL	203.0	203.0	191.0	191.0	100.0	100.0	98.8
	90-5335R	<DL	<DL	NA	<DL	72.9	71.3			102.2		99.5
699-52-55-001	90-5336	<DL	<DL	NA	<DL	265.0	265.0	236.0	235.0	100.0	100.4	99.8
	90-5336R	3.7	<DL	NA	<DL	78.5	76.8			99.8		99.2
699-52-57-027	90-5343	22.7	21.3	6.4	<DL	97.5	81.9			92.2		99.6
699-55-55-025	90-5344	17.2	16.8	2.4	<DL	116.0	96.2			102.9		98.8
699-55-57-050	90-5345	19.7										99.2
699-52-57-077	90-5350	15										99.2
699-52-57-077-B	90-5351	13.3	13.3	0	<DL	87.5	76.9			96.5		101.6
										mean	99.1	
										std. dev.	3.7	

\*DL = detection limit of 6 mg/Kg (theoretical)

WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug)	SPIKE SAMPLE (ug/L)	SPIKE (ug/L)	BLANK SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 BLANK SPIKE	C4 LSC SAMPLE
699-52-57-049	90-5346	<DL	<DL	NA								
699-52-57-050A	90-5347	<DL	<DL	NA	<DL	4980.0	4980.0	5040.0	4990.0	100.0	101.0	100.0
699-52-57-074	90-5352 (a)	<DL	<DL	NA		5250.0	5000.0			105.0		
699-52-57-077A	90-5353 (b)	<DL	<DL	NA		5220.0	4980.0			104.8		
										mean	103.3	99.6
										std. dev.	2.8	0.7

\*DL = detection limit of 55 ug/L

Note: RPD only calculated when results are >DL.

(a) Hold time missed by 4.3 hrs.

(b) Hold time missed by 3.5 hrs.

## CYANIDE ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-270, Total Cyanide in Waters, Solids or Sludges. The methodology is comparable to CLP SOW 788 Method 335.2 distillation and colorimetric technique for the analysis of cyanide. The analysis was performed in building 3720 in the 300 area.

The procedure, PNL-ALO-270, did not reflect the correct CLP standard preparation guidelines (Section 7.3.2.1 and 7.4.2.1). The analysts made a deviation to the procedure and used the client requested method, CLP SOW (788), Method 335.2, for the standard preparation (page D-76). An Interim Change Notice (ICN) or revision to the procedure will be written.

One set of samples was inadvertently spiked with a level above the CLP required spike level. The resulting % recovery was above 95%. During the analysis of the other samples, the KCN spike solution was found to be 80% of the specified CLP procedure requirements by titration with  $\text{AgNO}_3$ . New KCN solution was prepared for subsequent batches.

The sample results were below the client required detection limits of 10  $\mu\text{g/L}$  and 1  $\text{mg/Kg}$ . Sample results are all below 2 ppm therefore, free cyanide analysis was not required.

Upon review of the sample spiked data results, for soils results, the mean recovery is 103.3% with a standard deviation of 8% and for water results the mean recovery is 103.7% with a standard deviation of 2.2%. The spiked blank results mean recovery is 103.4% with a standard deviation of 9.7%. The overall spike recovery had a precision of  $\pm 7\%$  and a bias (accuracy) of  $+ 3.5\%$  on the average.

The general Environmental Protection Agency (EPA) hold time for total cyanide is 12 days. In many cases the hold time was not met. The delay in work is attributed to the above mentioned method/procedure problems and internal logistics problems with Radiation Protection Technology (RPT). Attention was spent on analyzing the soil samples to meet (or come as close to) the hold times as they are more important and more critical to the investigation of the task. Note that the soils greatest "miss" on hold times is three days (Table 4, footnotes d and e). The water samples were field

blanks. When it was determined that hold times may not be met, priority was given to soil samples. There is no impact from the hold time not being met on the results of the soil sample analyses as they are below detection limits and the analysis was performed only 1 to 3 days late. There is no impact on the results of the late analysis dates of the water samples as they are below the detection limits as expected of field blanks.

TABLE 4: TOTAL CYANIDE ANALYSIS DATA

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	G1		RPO	G5 BLANK (ug)	G3		G6		% RECOVERIES		
		SAMPLE (mg/Kg)	G2 SAMPLE DUP (mg/Kg)			SPIKE SAMPLE (mg/Kg)	SPIKE (mg/Kg)	BLANK SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 BLANK SPIKE	LCS SAMPLE
699-52-57-001	90-5335 (d)	0	R 0.1		1.7 (a)	16.14	16.70 (b)	N/A	N/A	96.6	82.7	3.98 (c)
699-52-55-001	90-5336	0.1	0.1		0	15.29	15.66 (b)	N/A	N/A	97.6	100.2	110.8
699-52-57-027	90-5343 (e)	0	J 0.1		0	9.20	9.85	N/A	N/A	93.5	107.8	96.3
699-55-55-025	90-5344 (e)	0	J 0.1		0	8.52	8.20	N/A	N/A	103.9	114.5	113.5
699-55-57-050	90-5345	0.6	0.2		0	9.39	8.07	N/A	N/A	116.4	106.7	116.1
699-52-57-077	90-5350	0.1	0.1		0.4	8.70	7.98	N/A	N/A	109.0	115.2	101.6
699-52-57-077-B	90-5351	0.1	0.1		0.6	8.93	8.40	8.5	8.4	106.3	106.7	91.1
mean										103.3	104.8	
std. dev.										8.0	11.0	

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	G1		RPO	G5 BLANK (ug)	G3		G6		% RECOVERIES		
		SAMPLE (ug/L)	G2 SAMPLE DUP (ug/L)			SPIKE SAMPLE (ug/L)	SPIKE (ug/L)	BLANK SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 BLANK SPIKE	LCS SAMPLE
699-52-57-049	90-5346 (f)	0.4	J 0.8		0.2	41.15	39.82	41.84	39.82	103.4	105.1	108.3
699-52-57-050A	90-5347 (g)	0.9	J 0.3		0.7	41.47	39.82	40.61	39.82	104.2	102.0	104.7
699-52-57-074	90-5352 (h)	0.1	J 0.2		1.9	40.19	39.82			100.9		97.2
699-52-57-077A	90-5353 (i)	0.1	J -0.2		-0.3	42.24	39.82	37.12	39.82	106.1	93.2	100.9
mean										103.7	100.1	
std. dev.										2.2	6.2	

Detection limits for water = 1 ug/L

Detection limit for soil = 0.1-0.4 mg/Kg (theoretical)

- (a) Blank was turbid due to exfoliation of precipitates from glass frit of adsorber.  
 (b) Spike level higher than required due to miss calculation of spike level by analyst.  
 (c) LCS recovery low. Attributed to Analytical Error.  
 (d) Hold time missed by 1 day.  
 (e) Hold time missed by 3 days.  
 (f) Hold time missed by 14 days.  
 (g) Hold time missed by 13 days.  
 (h) Hold time missed by 7 days.  
 (i) Hold time missed by 8 days.

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## GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestions were conducted in 125 mL narrow mouth bottles. Digestates were then analyzed by graphite furnace atomic absorption (GFAAS) following procedure PNL-ALO-215, Selenium (Atomic Absorption, Furnace Method), for selenium and PNL-ALO-216, Bismuth (Atomic Absorption, Furnace Technique), for bismuth. Se and Bi analysis methodologies are consistent with CLP SOW 788 Method 270.2. Digestion of samples was performed in building 325 and analysis by GFAAS was conducted in building 3720.

Analysis for Se and Bi was conducted on a Perkin-Elmer 5000, as a Zeeman equipped unit was not available. The quarterly instrument detection limit (IDL) for Se was found to be 1.5  $\mu\text{g/L}$ . The corresponding IDL for Bi was found to be 2.9  $\mu\text{g/L}$ .

A preliminary analysis of the samples was performed to determine the dilution factor necessary to bring the concentration to mid-range in the calibration curve. All samples were determined to have Se and Bi levels below the respective detection limits 3.75  $\mu\text{g/L}$  and 7.25  $\mu\text{g/L}$ . Detection limit was defined as 2.5 times the IDL.

Upon review of the data tables for selenium (Table 5A and 5B) and bismuth (Table 6A and 6B), the average recovery of selenium spike in waters is 98.2% with a standard deviation of 11.5%, the average recovery of selenium spike in soils is 65.3% with a standard deviation of 17.3%, the average recovery of bismuth spike in waters is 101.7% with a standard deviation of 6.1% and the average recovery of bismuth spike in soils is 90.5% with a standard deviation of 8.4%. A precision determined from the duplicate sample analysis is not possible since the results are below detection limits. Therefore, the precision and bias based on spike recovery information associated with this set of data are as follows:

Precision Bias (Accuracy)

Selenium in water	$\pm 12\%$	-2%
Selenium in soil	$\pm 17\%$	-35%
Bismuth in water	$\pm 6\%$	+ 2%
Bismuth in soil	$\pm 8\%$	- 9%

The large bias associated with the analysis of selenium in soil samples is attributed to the low concentrations of selenium and spike standard in the samples and matrix interference (of iron) in the samples. The matrix interference of iron interferes in the background determination in selenium analysis. A Zeeman background correction attachment (not available in this laboratory) is necessary for this matrix correction. The data in Tables 5A, 5B, 6A, and 6B are flagged with appropriate CLP (as defined in CLP SOW 7/88, pages B-19 and 20) flags where necessary. ICB, CCB, ICV, CRA, etc. are as defined in the CLP SOW 7/88, Section E.

The CLP SOW 788 specified hold time of 180 days was met as well as the contract required hold time of 120 days.



TABLE 5A: SELENIUM ANALYSIS DATA  
ACID EXTRACTABLE SELENIUM IN WATER SAMPLES

Lab log #	Soln. Conc. (ug/L)	Results (ug/L)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike %Rec.	Standard %Rec.	CLP flags
ICB	0.5						
ICV (a)	26.0					98	
CCB	0.5						
CRA	5.1					102	
CCB	-0.1						
90-5346-B5	-0.1						
90-5346-B5-AS	11.5			10	115		
90-5346-B1	-0.4	<DL					U
90-5346-B1AS	10.0			10	100		
90-5346-B3	19.7	19.7		25	79		
90-5346-B2	0.5	<DL	N/A				B
90-5346-B2-AS	9.4			10	94		
90-5346-B4	21.9	21.9		25		88	
90-5346-B4-AS	33.5			10	116		
90-5346-B6	21.8	21.8		25	87		
90-5347-B1	0.3	<DL					B
90-5347-B1-AS	10.6			10	103		
CCV	25.5					97	
CCB	0.0						
90-5352-B1	-0.2	<DL					U
90-5352-B1-AS	9.9			10	99		
90-5353-B1	0.1	<DL					B
90-5353-B1-AS	10.0			10	100		
(d) 90-5357-B1	0.1	<DL					B
(d) 90-5357-B1-AS	10.2			10	102		
(d) 90-5358-B1	0.5	<DL					B
(d) 90-5358-B1-AS	9.0			10	85		
CCV	25.7					97	
CCB	0.6						

Notes:

(a) Used a dilution of ICF/ICV-2 = 26.4 ug/L  
(b) Analytical spike (AS) = 10 ug/L.  
(c) Pre-digest spike = 25 ug/L. for B3, B4 and B6.  
(d) Samples not part of Data Package #1  
(e) RPD only calculated if both sample and duplicate are greater than detection limit.

B1 = SAMPLE  
B2 = SAMPLE DUPLICATE  
B3 = SAMPLE + Se SPIKE  
B4 = LAB. CONTROL STANDARD  
B5 = PROCEDURAL BLANK  
B6 = SAMPLE + Se SPIKE DUPLICATE

Sample I.D.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
699-52-57-049	90-5346	10/04/86	10/21/86	11/05/86
699-52-55-050A	90-5347	10/04/86	10/21/86	11/05/86
699-52-57-074	90-5352	10/09/86	10/21/86	11/05/86
699-55-57-077A	90-5353	10/09/86	10/21/86	11/05/86

CRDL\*: 5 ug/L  
DL (IDL x 2.5): 3.75 ug/L

\*CRDL = Contract required detection limit

TABLE 5B: SELENIUM ANALYSIS DATA  
ACID EXTRACTABLE SELENIUM IN SOIL SAMPLES

Lab log #	Soln. Conc. (ug/L)	Results (mg/Kg)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike XRec.	Standard XRec.	CLP flags
ICB	0.2						
ICV (a)	25.6					97	
CCB	-0.1						
CRA	4.8					96	
CCB	-0.1						
90-5335-B5	-0.1						
90-5335-B5-AS	9.5			10	95		
90-5335-B1	-3.6	<DL	WT				W,U
90-5335-B1-AS	5.3			10	53		
90-5335-B3	-1.3	0		25	0		
90-5335-B3-AS	7.5			10	75		
90-5335-B2	-2.4	<DL	N/A				U
90-5335-B2-AS	5.9			10	59		
90-5335-B4 (d)	10.7	34.2				87	W
90-5335-B4-AS	10.1			10	74		
90-5335-B6	-0.8	0		25	0		
90-5335-B6-AS	7.8			10	78		
90-5335-B7	23.8			25	95		
90-5336-B1	-2.7	<DL	WT				W,U
90-5336-B1-AS	5.9			10	59		
CCV	25.3					96	
CCB	0.5						
90-5343-B1	-3.8	<DL	WT				W,U
90-5343-B1-AS	5.4			10	54		
90-5344-B1	-4.3	<DL	WT				W,U
90-5344-B1-AS	5.0			10	50		
90-5345-B1	-5.3	<DL	WT				W,U
90-5345-B1-AS	3.6			10	36		
90-5350-B1	3.3	<DL	WT				W,U
90-5350-B1-AS	6.2			10	62		
90-5351-B1	-2.7	<DL	WT				W,U
90-5351-B1-AS	5.9			10	59		
CCV	25.2					95	
CCB	0.3						

Notes:

(a) Used a dilution of ICF/ICV-2x 26.4 ug/L  
(b) Analytical spike (AS) = 10 ug/L.  
(c) Pre-digest spike = 25 ug/L. for B3, B6 and B7.  
(d) B4 = LCS-0287 containing 39.2 mg/Kg Se  
(e) RPD only calculated if both sample and duplicate are greater than detection limit.

B1 = SAMPLE  
B2 = SAMPLE DUPLICATE  
B3 = SAMPLE + Se SPIKE  
B4 = LAB. CONTROL STANDARD  
B5 = PROCEDURAL BLANK  
B6 = SAMPLE + Se SPIKE DUPLICATE  
B7 = SPIKED PROCEDURAL BLANK

Sample I.D.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
699-52-57-001	90-5335	09/25/86	11/11/86	11/13/86
699-52-55-001	90-5336	09/25/86	11/11/86	11/13/86
699-52-57-027	90-5343	10/01/86	11/11/86	11/13/86
699-55-55-025	90-5344	10/01/86	11/11/86	11/13/86
699-55-57-050	90-5345	10/04/86	11/11/86	11/13/86
699-52-57-077	90-5350	10/09/86	11/11/86	11/13/86
699-52-57-077-B	90-5351	10/09/86	11/11/86	11/13/86

CRDL\*: 0.5 mg/Kg  
DL (IDL x 2.5): 3.75 ug/L

\*CRDL = Contract required detection limit

*JL*  
12/06/86

**TABLE 6A: BISMUTH ANALYSIS DATA**  
**ACID EXTRACTABLE BISMUTH IN WATER SAMPLES**

Lab log #	Soln. Conc. (ug/L)	Results (ug/L)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike %Rec.	Standard %Rec.	CLP flags
ICB	-0.6						
ICV (a)	33.5					98	
CCN	0.6						
CRA	9.8					98	
CCB	-0.8						
90-5346-B5	-0.1						
90-5346-B5-AS	19.1			20	95		
90-5346-B1	-0.2	<DL					U
90-5346-B1AS	19.9			20	99		
90-5346-B3	48.3	48.3		50	97		
90-5346-B2	1.7	<DL	N/A				
90-5346-B2-AS	21.8			20	100		
90-5346-B4	14.9	44.7		50		89	
90-5346-B4-AS	36.5			20	108		
90-5346-B6	40.3	48.3		50	97		
90-5347-B1	2.0	<DL					
90-5347-B1-AS	21.9			20	108		
CCV	36.7					110	
CCB	0.4						
90-5352-B1	-1.3	<DL					U
90-5352-B1-AS	23.1			20	115		
90-5353-B1	-1.1	<DL					U
90-5353-B1-AS	20.0			20	100		
(d) 90-5357-B1	-0.8						U
(d) 90-5357-B1-AS	20.4			20	102		
(d) 90-5358-B1	-0.6						U
(d) 90-5358-B1-AS	19.7			20	98		
CCV	32.6					98	
CCB	0.4						

**Notes:**

- |  |                                  |
|--|----------------------------------|
| (a) ICV & CCV = 33.33 ug/L   | B1 = SAMPLE                      |
| (b) Analytical spike (AS) = 20 ug/L.   | B2 = SAMPLE DUPLICATE            |
| (c) Pre-digest spike for B3, B4 and B6 = 50 ug/L.                                      | B3 = SAMPLE + B1 SPIKE           |
| (d) Samples not part of Data Package #1  | B4 = LAB. CONTROL STANDARD       |
| (e) RPD only calculated if both sample and duplicate are greater than detection limit. | B5 = PROCEDURAL BLANK            |
|  | B6 = SAMPLE + B1 SPIKE DUPLICATE |

Sample I.D.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
699-52-57-049	90-5346	10/04/86	10/21/86	11/04/86
699-52-55-050A	90-5347	10/04/86	10/21/86	11/04/86
699-52-57-074	90-5352	10/09/86	10/21/86	11/04/86
699-55-57-077A	90-5353	10/09/86	10/21/86	11/04/86

CRDL\* : 60 ug/L  
DL (IDL x 2.5): 7.25 ug/L

\*CRDL = Contract required detection limit

TABLE 6B: BISMUTH ANALYSIS DATA  
ACID EXTRACTABLE BISMUTH IN SOIL SAMPLES

Lab log #	Soil. Conc. (ug/L)	Results (mg/Kg)	Duplicate RPD (e)	Spike (ug/L) (b,c)	Spike %Rec.	Standard %Rec.	CLP flags
ICB	-0.1						
ICV (a)	24.5					98	
CCB	0.0						
CRA	9.4					94	
CCB	-0.1						
90-5335-B5	-0.3						
90-5335-B5-AS	18.2			20	91		
90-5335-B1	-0.6	<DL					U,N
90-5335-B1AS	18.0			20	90		
90-5335-B3	36.5	3.53		50	73		N
90-5335-B2	0.1	<DL	N/A				
90-5335-B2-AS	18.9			20	94		
90-5335-B4 (d)	17.8	32.5				89	
90-5335-B4-AS	35.6			20	89		
90-5335-B6	37.2	3.44		50	74		N
90-5335-B7	50.8			50	102		
90-5336-B1	0.3	<DL					
90-5336-B1-AS	19.6			20	96		
CCV	26.0					106	
CCB	0.6						
90-5343-B1	-2.5	<DL					U,N
90-5343-B1-AS	19.3			20	96		
90-5344-B1	-2.6	<DL					U,N
90-5344-B1-AS	18.3			20	91		
90-5345-B1	-2.4	<DL					U,N
90-5345-B1-AS	18.9			20	94		
90-5350-B1	-1.4	<DL					U,N
90-5350-B1-AS	19.5			20	97		
90-5351-B1	-1.8	<DL					U,N
90-5351-B1-AS	18.1			20	90		
CCV	26.8					107	
CCB	0.7						

Notes:

(a) Used a dilution of ICV-2 = 26.4 ug/L  
(b) Analytical spike (AS) = 20 ug/L.  
(c) Pre-digest spike = 50 ug/L.  
(d) B4 = LCS-028/+ 40 ug B1 spike  
(e) RPD only calculated if both sample & duplicate are greater than detection limit.

B1 = SAMPLE  
B2 = SAMPLE DUPLICATE  
B3 = SAMPLE + B1 SPIKE  
B4 = LAB. CONTROL STANDARD  
B5 = PROCEDURAL BLANK  
B6 = SAMPLE + B1 SPIKE DUPLICATE  
B7 = SPIKED PROCEDURAL BLANK

Sample I.D.	Lab. Log #	Sampling Date	Extraction Date	Analysis date
699-52-57-001	90-5335	09/25/86	11/11/86	11/13/86
699-52-55-001	90-5336	09/25/86	11/11/86	11/13/86
699-52-57-027	90-5343	10/01/86	11/11/86	11/13/86
699-55-55-025	90-5344	10/01/86	11/11/86	11/13/86
699-55-57-050	90-5345	10/04/86	11/11/86	11/13/86
699-52-57-077	90-5350	10/09/86	11/11/86	11/13/86
699-52-57-077-B	90-5351	10/09/86	11/11/86	11/13/86

CRDL\* : 10 mg/Kg  
DL (IDL x 2.5): 7.25 ug/L

\*CRDL = Contract required detection limit

TABLE 7: FREE CYANIDE ANALYSIS

Sample ID#	Sample mg/Kg	Sample Duplicate mg/Kg	Sample+ Spike mg/Kg	Spike Added mg/Kg	(20ppb) Control Std. ppb	Matrix Blank mg/Kg	Spike Duplicate mg/Kg	Spike Rec %	Control Std. % Rec.
90-5335-J-1	<0.2 <i>WJ</i>								
90-5335-J-4					19.9				99.5
90-5335-J-4					15.9				79.5
90-5335-J-4					14.7				73.5
90-5335-J-4					18.3				91.5
90-5335-J-5						<0.2			
90-5336-J-1	<0.2 <i>WJ</i>								
90-5336-J-3			0.44	1				44	
90-5336-J-6				1			<0.2		
90-5336-J-6				1			0.58 *	58	
90-5336-J-6				1			0.745 **	74.5	
90-5343-J-1	<0.2 <i>WJ</i>								
90-5343-J-2		<0.2							
90-5344-J-1	<0.2 <i>WJ</i>								
								mean	58.8
								std. dev.	15.3
									86
									11.7

Note: Sample results reported based on undried sample weight.

\* Freshly sonicated spiked sample - spike sonicated 10/8/90.

\*\* Stirred (magnetically) spiked sample - not sonicated and hence no temperature rise during leaching.

Note: Based on control standard run before and immediately after this spiked sample, the spike recovery is within allowable limits. Detector response drift is obvious here in later portion of the analytical session.

J1 = SAMPLE

J2 = DUPLICATE SAMPLE

J3 = SPIKE SAMPLE

J4 = STANDARD

J5 = METHODS BLANK

J6 = SPIKE DUPLICATE

*JL 12/06/90*

**200-BP-1  
GROUNDWATER ANALYSIS PROJECT**

**PARAMETERS OF INTEREST  
DATA PACKAGE/REPORT No. 1**

**Revision 0**

**APPENDIX B  
CHAIN OF CUSTODY**



200-BP-1  
GROUNDWATER ANALYSIS PROJECT

PARAMETERS OF INTEREST  
DATA PACKAGE/REPORT No. 1

Appendix B  
TABLE OF CONTENTS

Appendix B - Chain of Custody

- B1 - Westinghouse Chain of Custody and Sample Analysis Request Forms
- B2 - PNL Chain of Custody Forms

B00-001

**B1 - WESTINGHOUSE CHAIN OF CUSTODY,  
SAMPLE ANALYSIS REQUEST FORMS  
AND PNL SAMPLE RECEIPT FORMS**

**B01-001**



Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson;

Telephone (509) 373-3818

Sample Collected by W.S. Thompson, JW Robertso

Date 9/26/90

Time 0845; 1008;

Sample Locations 699-52-57; 699-55-55

Ice Chest No. #SLEEPY POLYCOOLER

Field Logbook and Page No. WHC-N-287-2p.

Remarks SOIL SAMPLES COLLECTED IN 500 ml. AMBER GLASS BOTTLES, SENT TO 325 LAB.  
FOR ANALYSIS OF PARAMETERS OF INTEREST (200-AP-1 RI/ES) DOE/RL 88-32 Rev 1

Bill of Lading No. NA

Offsite Property No. NA

Method of Shipment HAND CARRY ON HSL SAMPLE VAN TO 325 LAB.

Shipped to 325 Bldg, DNL LAB.

Possible Sample Hazards none identified with field instruments - may be  
POTENTIAL UNKNOWN CONSTITUENTS.

Sample Identification

1) 699-52-57-001

2, 500ml, amber glass, soil, chemical analysis for Parameters of Interest

RADIOISOTOPES: TOTAL ALPHA, TOTAL BETA; TRITIUM; Technetium-99;  
Strontium-90; Cesium-137; Cobalt-60; Plutonium-238;  
Plutonium-239/240; TOTAL URANIUM; Ruthenium-106;  
NON-RADIOISOTOPES: NITRATE; TOTAL CYANIDE; SULFATE; SELENIUM;  
FERRICYANIDE; FREE CYANIDE; Bismuth; Phosphate

2) 699-55-55-001

2, 500ml, amber glass, soil, chemical analysis for Parameters of Interest  
AS STATED ABOVE.

Chain of Possession

Relinquished by: W.S. Thompson

Received by: R.Z. Steffler

Date/Time: 9/26/90 10:30 AM.

Relinquished by: R.Z. Steffler

Received by: W. W. W.

Date/Time: 9/26/90 11:52 am

Relinquished by:

Received by:

Date/Time:

Relinquished by:

Received by:

Date/Time:

101-002

A-GG00-407 (04/90)



## PART I: FIELD SECTION

Collector W.S. Thompson; Jw Roberts; RZ Steffer Date Sampled 9/26/90 Time 0845 hours  
Company Contact W.S. Thompson; Jw Roberts Telephone (509) 373-3818 <sup>1008</sup>

Field Information\*\* soil sample collected in bottles and placed on wet  
ice; field instruments detect NO hazardous constituents.

Special Handling and/or Storage hand carry in ASL sample van to 325 PNL  
Lab - same day delivery

**PART II: LABORATORY SECTION**

Received by MW Chen Title Tech Group Leader Date 9/26/90  
Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

701-003

SAMPLE RECEIPT FORM

Delivered by: R.I. Steffler Date/Time: 9/26/90 11:52  
Received by: MICHAEL W. URIE  
Customer Sample Number(s): 699-52-57-001, 699-55-55-001  
ALO Sample Number(s): 90-5335 90-5336

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐  
2. Additional Shipping Forms (list):  
SAMPLE ANALYSIS REQUEST ACCOMPANIED COC.

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: RED PLASTIC SEAL ON BOTTLES GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

ICE IN COOLER - COOLER IN GOOD CONDITION

6. Condition of Sample Vials.

OKAY

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agreement *MW*

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-004

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone 373-3818

Sample Collected by W.S. Thompson / R.E. Steffer Date 10/2/90 Time 1425

Sample Locations 699-52-57

Ice Chest No. SLEEPY Field Logbook and Page No. WHC-11-287-2

Remarks Samples collected for 200BP-1 RI/ES

Bill of Lading No. NA Offsite Property No. NA

Method of Shipment hand carry to 325 PNL lab.

Shipped to 325 PNL for Parameter of Interest analysis

Possible Sample Hazards none indicated with field instruments

Sample Identification

1) 699-52-57-027

1, 1 liter, glass, soil, chemical analysis of Parameters of Interest  
see Statement of Work

Chain of Possession

Relinquished by: <u>W.S. Thompson</u>	Received by: <u>R.E. Steffer</u> <u>R.E. Steffer</u>	Date/Time: <u>10/2/90 1515 hr.</u>
Relinquished by: <u>R.E. Steffer</u>	Received by: <u>M.W. Chin</u> <u>M.W. Chin</u>	Date/Time: <u>10/2/90 1600 hrs</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-005

A-6000-407 (04/90)



## PART I: FIELD SECTION

Date Sampled 10/6/90 Time 1425 hours

Telephone (509) 373-3818

[illegible]

Field Information\*\* sample collected to be analyzed for parameters of interest suggesting 200-BP-1 RI/fs.  
no hazards indicated by field instruments.  
Special Handling and/or Storage keep chilled on wet ice.

## PART II: LABORATORY SECTION

Received by M. N. Whi Title Group Leader Date 10/2/90  
Analysis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

B01-006

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/2/90 1600

Received by: URIE

Customer Sample Number(s): 699-52-57-027

ALO Sample Number(s): 90-5343

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):  
Sample Analysis Request

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

PACKED IN TO 325 BLDG BY STEFFLER - COLD  
NOT VERIFY SHIPPING CONTAINER, SAMPLE FELT COLD

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

AGREE MWL

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-007



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Connector W.S. Thompson / RZ Steffler Date Sampled 10/3/90 Time 0800 hours  
Company Contact W.S. Thompson Telephone (509) 373-3818

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
<u>699-55-55-025, 2, Miter,</u>	<u>glass, soil,</u>	<u>Parameters of Interest</u>	<u>for 200-BP-1 -</u>
			<u>TOTAL ALPHA, TOTAL BETA, TRITIUM</u>
			<u>TECHNETIUM-99, Strontium-90, Cesium-137,</u>
			<u>COBALT-60, PLUTONIUM-238, PLUTONIUM-</u>
			<u>239/240, TOTAL URANIUM, RUTHENIUM-106,</u>
			<u>NITRATE, TOTAL CYANIDE, SULFATE,</u>
			<u>SELENIUM, FERROCYANIDE, FREE</u>
			<u>CYANIDE, BISMUTH, PHOSPHATE</u>

Field Information\*\* Samples hand carried to 325 DNL LAB by ASL  
sampling van. Analysis for 200-BP-1 RI/FS. See  
statement of work.

Special Handling and/or Storage Keep chilled on wet ice.

## PART II: LABORATORY SECTION

Received by MW Thier Title Croup Leader Date 10/3/90  
Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-008

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone 373-3818  
Sample Collected by W.S. Thompson / R. J. Steph Date 10/3/90 Time 0850  
Sample Locations 699-55-55, wellcut, north of 200 EXT  
Ice Chest No. N/A Field Logbook and Page No. WMC-N-287-2 p29,30,31  
Remarks Samples to be analyzed for 200BP-1 parameters of  
Interest (samples put in 2 jars instead of one - at 50 lab can  
homogenize in jar for push to opening. N/A 10/3/90  
Bill of Lading No. N/A Offsite Property No. N/A  
Method of Shipment hand carry to 325 lab by ASL sample van  
Shipped to 325 PWL LAB.  
Possible Sample Hazards None indicated by field instruments

Sample Identification

D699-55-55-025

2, 1-liter glass jars, soil, Parameters of Interest - 200BP-1  
RI/ES

Chain of Possession

Relinquished by: <u>W.S. Thompson</u>	Received by: <u>R. J. Steph</u>	Date/Time: <u>10/3/90 11:00</u>
Relinquished by: <u>R. J. Steph</u>	Received by: <u>W. W. W.</u>	Date/Time: <u>10/3/90 12:00 pm</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-009

A-6000-407 (04/90)



SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/3/90 12:01 pm

Received by: M. Urie

Customer Sample Number(s): 699-55-55-025 (Two Bottles)

ALO Sample Number(s): 90-5344

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

Sample Analysis Request

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: \_\_\_\_\_

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

PACKED INTO 325 Bldg by Steffler, Could NOT verify shipping container. Samples felt old

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree mwr

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-010

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact Wendy Thompson Telephone 373-3818  
Sample Collected by W.S. Thompson/R.E. Steff Date 10/5/90 Time 1030:0945:1045  
Sample Locations 699-52-57, 600 AREA, North of 200 EAST (200-BP-1)  
Ice Chest No. "sleepy cooler" Field Logbook and Page No. WHC-N-287-2-p3235  
Remarks samples collected for analysis of 200-BP-1 RI/FS Parameters  
of Interest (see statement of work & DOE/RL 88-32)  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry, same day-day in ASL sample van  
Shipped to 323 PNL, 300 AREA  
Possible Sample Hazards none indicated by field instruments  
samples chilled on wet ice

Sample Identification

699-52-57-050 200-BP-1  
2, 1-liter, glass, soil (1/2 full), Parameters of Interest (see statement of work)  
699-52-57-049  
1, 500ml., glass, water, chemical analysis of anions & tritium  
3, 1-liter, glass, water, NaOH, chemical analysis of CN and Free CN  
1, 1-liter, glass, water, HNO<sub>3</sub>, chemical analysis of metals, radiochemical analysis  
699-52-57-050A  
1, 500ml., glass, water, chemical analysis of anions & tritium  
3, 1-liter, glass, water, NaOH, chemical analysis of CN and Free CN  
3, 1-liter, glass, water, HNO<sub>3</sub>, chemical analysis of metals, radiochemical analysis

Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>R.E. Steff</u> <u>R.E. Steff</u>	Date/Time: <u>10/5/90 1200 hrs</u>
Relinquished by: <u>R.E. Steff</u> <u>R.E. Steff</u>	Received by: <u>B.M. Gillespie</u> <u>B.M. Gillespie</u>	Date/Time: <u>10/5/90 13:17 hrs</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

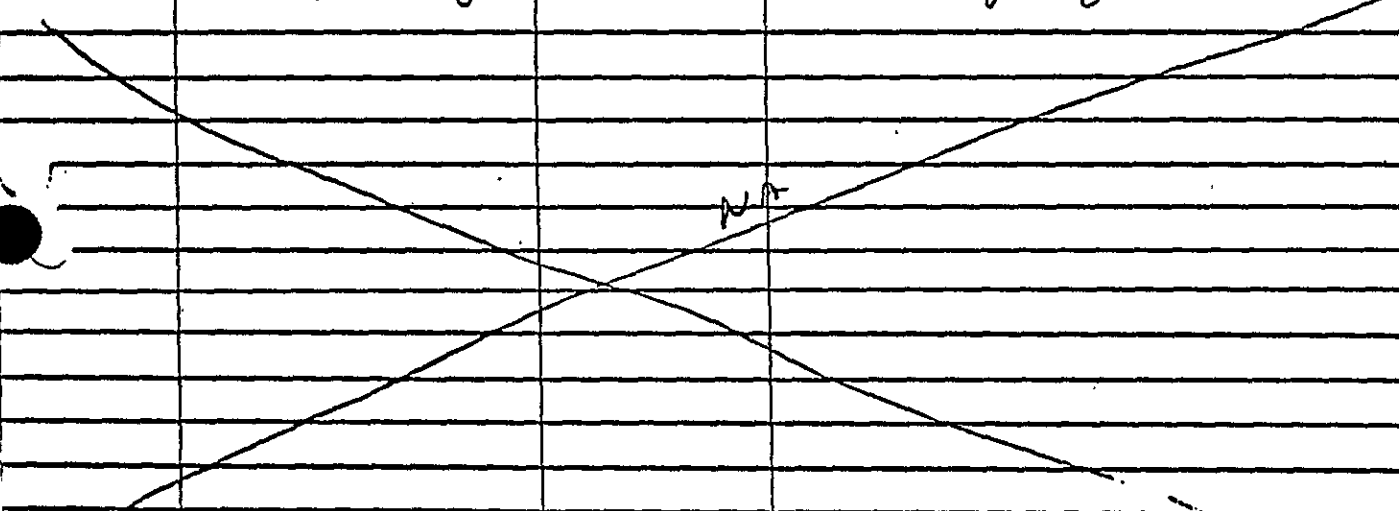


Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Director Wendy S. Thompson / RE Steffler Date Sampled 10/5/90 Time 1030 hours  
Company Contact W.S. Thompson Telephone (509) 373-3818 1045

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
699-52-57-050	2, 1-liter, glass, soil	Parameters of Interest	200-BP-1 (see statement of work)
699-52-57-049	1, 500ml, glass, water	chemical analysis of anions + tritium	(bottle 1/2 full of water)
	3, 1-liter, glass, water, NaOH	chem. analysis of CN + Free CN	
	3, 1-liter, glass, water, HNO <sub>3</sub>	chem. analysis of metals	radiochem. analysis
699-52-57-050A	3, 1-liter, glass, water, NaOH	chem. analysis of CN + Free CN	
	3, 1-liter, glass, water, HNO <sub>3</sub>	chem. analysis of metals	radiochem. analysis
	1, 500ml, glass, water	chem. analysis of anions + tritium	
<div style="text-align: center;">  <p>NA</p> </div>			

Field Information\*\* Samples collected for 200-BP-1 RIES to be analyzed for Parameters of Interest. Samples chilled on wet ice & same day delivery to 325 PNL LAB.

Special Handling and/or Storage Keep chilled (see statement of work)

## PART II: LABORATORY SECTION

Received by B.M. Killip Title Project Manager Date 10-5-90  
Analysis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.  
Use back of page for additional information relative to sample location.

B01-012

A-6000-406 (07/89)

SAMPLE RECEIPT FORM

Delivered by: Stephler Date/Time: 13:17  
Received by: Gillespie  
Customer Sample Number(s): 699-52-57-050  
ALO Sample Number(s): 90-5345

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_  
2. Additional Shipping Forms (list):  
Sample analysis Request  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent \_\_\_\_\_

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

Good; ice in existence around sample vials. Sample kept in 12-15°C

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-013

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 13:17 pm  
Received by: Gillespie  
Customer Sample Number(s): 699-52-57-049 699-52-57-05A  
ALO Sample Number(s): 90-5346 90-5347

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐  
2. Additional Shipping Forms (list):  
Sample Analysis Request  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: \_\_\_\_\_

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: 1 500 ml glass CO/FREE CN ANIONS/Titration (NOTHING)  
3 1L metals/rad chem (NaOH)  
3 1L CN/Free CN (NaOH)

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

Sample shipping container. Ice in existence around sample vials  
Gillespie  
10-5-90

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree MWA

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-014

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: Wendy S. Thompson Telephone (509) 373-3818  
Sample Collected by: W.S. Thompson Date 10/10/90 Time 1015, 1100, 1100, 1115  
Sample Locations: WTS 19/10/190 699-52-57 ; WELSITE IN 600 AREA, NORTH of 200 EAST  
Ice Chest No. #3 Coleman cooler Field Logbook and Page No. WHC-N-287-2 pg 42-44  
Remarks: Samples collected for analysis of Parameters of Interest supporting the 200-BP-1 RI/ES. (See statement of work & work plan DOE/RL 88-32)  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment: Hand carry same day by ASL Sample Van to 325 PNL Lab  
Shipped to: 325 PNL Laboratory (300 AREA)  
Possible Sample Hazards: None indicated by field instruments.  
(Keep chilled on ice during transportation to lab)

Sample Identification

699-52-57-077  
2, 1-liter, glass, soil, (1/2 FULL AS REQUESTED BY LAB), Parameters of Interest (see 200-BP-1 Statement of work)

699-52-57-077B  
2, 1-liter, glass, soil, (1/2 FULL AS REQUESTED BY LAB), PARAMETERS OF INTEREST

7-52-57-074  
1, 500ml, clear glass, water; chemical analysis of ANIONS & TRITIUM  
3, 1 liter, glass, water; 2ml NaOH; analysis of CN & FREE CYANIDE  
3, 1 liter, glass; water 2ml HNO<sub>3</sub>; analysis of metals & radiochemical analysis

699-52-57-077A  
1, 500ml, clear glass; water; chemical analysis of anions & tritium  
3, 1 liter, amber glass; 2ml NaOH; analysis of CN & free CN  
3, 1 liter, amber glass, water; 2ml HNO<sub>3</sub>; analysis of metals & radiochemicals

Parameters of Interest

Parameters of Interest

Chain of Possession

Relinquished by: <u>W. S. Thompson</u> <u>W.S. Thompson</u>	Received by: <u>R. J. Stoff</u> <u>R. J. Stoff</u>	Date/Time: <u>10/10/90 1155</u>
Relinquished by: <u>R. J. Stoff</u> <u>R. J. Stoff</u>	Received by: <u>M. W. Thur</u> <u>M. W. Thur</u>	Date/Time: <u>10/10/90 1305 HR</u>
Relinquished by:	Received by:	Date/Time:

RO1-015

A-6000-407 (04/90)



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W.S. Thompson / R.Z. Steffler

Date Sampled 10/10/90 Time 10:00 hours

Company Contact W.S. Thompson

Telephone (509) 373-3815

200-BP-1

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) 699-52-57-077	2-1 liter, clear glass	Soil (K-field)	Parameters of Interest <sup>200-BP-1</sup>
2) 699-52-57-078	2-1 liter, clear glass	Soil (K-field)	Parameters of Interest
3) 699-52-57-074	1,500ml, clear glass	water, anions + tritium	Parameters of Interest
	3, 1-liter, amber glass	water, 2ml NaOH	analysis of CN & Free CN
	3, 1-liter, amber glass	water, 2ml HNO <sub>3</sub>	analysis of metals + radiochem.
4) 699-52-57-077A	1,500ml, clear glass	water	anions + tritium; Parameters of Interest
	3, 1-liter, amber glass	water 2ml NaOH	analysis of CN & Free CN
	3, 1-liter, amber glass	water 2ml HNO <sub>3</sub>	analysis of metals + radiochem.
<div></div>			

Field Information\*\* All samples (soil + water) to be analyzed for parameters of interest Supporting 200-BP-1 K-F/FS

Special Handling and/or Storage Keep samples chilled. Hand delivery, same day to 325 PNL LAB - 300 AREA

## PART II: LABORATORY SECTION

Received by MW Zhu

Title Group Leader

Date 10/10/90

Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-016

SAMPLE RECEIPT FORM

Delivered by: Jeffrey Date/Time: 10/10/90 13:05

Received by: Umi

Customer Sample Number(s): 699-52-57-077, -0778, -074-077A

ALO Sample Number(s): 90-5350, 5351, 5352, 5354, 5353 10/11/90

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐
2. Additional Shipping Forms (list):  
Request for analysis
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent ☐  
If Present, Condition: GOOD
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.  
Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  
ICED
6. Condition of Sample Vials.  
GOOD
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.  
Agree mwr
8. Resolution of Problems or Discrepancies.  
N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-017



Attachment 5

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 2

## 200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 2; Rev 0

PARAMETERS OF INTEREST - soil  
sample value/qualifier

Parameter	DL	55-55-050	55-55-075	52-57-101.5	55-55-101	55-55-125	55-55-125A	52-57-128
=====								
ANIONS (ppm)								
-----								
nitrite	0.2	<DL	<DL	<DL	<DL	<DL	<DL	<DL
nitrate	0.2	0.4	0.5	0.4	0.8	0.5	0.5	0.5
phosphate	0.6	<DL	<DL	<DL	<DL	<DL	<DL	<DL
sulfate	3.8	8.2	17.8	5.4	15.2	21.3	16.1	4.4
CN (ppm)								
-----								
total	0.1-0.4	<DL UJ	<DL UJ	<DL UJ	0.1 UJ	0.1 U	<DL UJ	<DL UJ
free	N/A	NR	NR	NR	NR	NR	NR	NR
GFAA (ppb)								
-----								
Se	1.3	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ
Bi	4.3	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ	<IDL UJ

NR not reported and/or requested

all sample numbers begin with 699- prefix

200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 2; Rev 0

PARAMETERS OF INTEREST - water  
sample value/qualifier

Parameter	DL	55-55-048	55-55-050A	55-55-073	55-55-075A
=====					
ANIONS (ppb)					
-----					
nitrite	14.9	<DL	<DL	<DL	<DL
nitrate	14.9	<DL	<DL	35.9 U	<DL
phosphate	60	<DL	<DL	<DL	<DL
sulfate	250	<DL	<DL	<DL	<DL
CN (ppb)					
-----					
total	1	1.5 J	<DL UJ	<DL UJ	<DL UJ
free	N/A	NR	NR	NR	NR
GFAA (ppb)					
-----					
Se	3.75	<DL	<DL	<DL	<DL
Bi	7.25	<DL	<DL	<DL	<DL

NR not reported and/or requested

200-BP-1 DATA QUALIFIER DEFINITIONS

---

- U      The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J      The associated value is an estimated quantity.
- UJ     The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R      The data are unusable.



Westinghouse  
Hanford Company

# OSM RCRA LEVEL C DATA ASSESSMENT

DATE 12/30/90

REVIEWED BY JA Lerch

LABORATORY PNL-325

CASE # TPP 16772

SDG # Report 2 Rev 0

- parameters of  
interest

SAMPLES/MATRIX

- all samples  
begin w/699  
prefix

55-55-050

55-55-101

55-55-048

55-55-098

55-55-050A

55-55-125

55-55-075

55-55-125A

55-55-073

52-57-128

55-55-075A

52-57-125

52-57-101.5

52-57-153

55-55-150

## DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	Anions	CN(total)	GFAA
1. <u>Holding times</u>		<u>0</u>	<u>X</u>	<u>0</u>
2. <u>Matrix Spike</u>		<u>0</u>	<u>0</u>	<u>X</u>
3. <u>Duplicate Analysis</u>		<u>0</u>	<u>0</u>	<u>0</u>
4. <u>Method Blanks</u>		<u>X</u>	<u>X</u>	<u>0</u>
5. <u>Calibrations/Control Std.</u>		<u>0</u>	<u>0</u>	<u>0</u>
6. <u>Other</u>	<u>see attachment</u>			
7. _____		_____	_____	_____
8. _____		_____	_____	_____
9. _____		_____	_____	_____
10. _____		_____	_____	_____

0 = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: no major problems - all results  
acceptable with attached qualification

NOTES: see other for PNL-WHC sample # correlation  
+ sample matrix table

o Refer to the corresponding attachments for explanation of any problems.

## RCRA LEVEL C QC

Name JA LerchDate 12/30/90QC Check: Holding time

COMMENTS: Anions - all Holding time criteria met  
CN(total) - holding time criteria not met on several  
soil & water samples

GFAA - all holding time criteria met

ACTION: qualify associated sample results  
as per OSM guidelines

sample #	constituent	value/qual	sample #	constituent	value/qual
699-55-55-050	CN	UJ			
699-55-55-075		UJ			
699-52-57-101 S		UJ			
699-55-55-101		UJ			
699-52-57-125A		UJ			
699-52-57-128		UJ			
699-52-57-153		UJ			
699-55-55-150		UJ			
699-55-55-048		J			
699-55-55-050A		UJ			
699-55-55-073		UJ			
699-55-55-075A		UJ			

RCRA LEVEL C QC

Name

JA Lerch

Date

12/30/90

QC Check:

Matrix Spike

COMMENTS:

Anions - all recoveries within 75 to 126%

CN (total)

- all CN spike recoveries within 92-108%

GFAA

- several Se analytical spike ZR low, Se spike

ZR low (Soils); Bismuth spike ZR low (soil); all water ZR ok

ACTION:

qualify associated results as per OSM guidelines

sample #

constituent

value/qual

all soil

Se, Bi

LT

sample #

constituent

value/qual

GFAA

- low spike recoveries appear to be result of interferences and lack of Zeeman background correction

RCRA LEVEL C QC

Name JA Lerch PL Date 12/30/90

QC Check: Duplicate Analysis

COMMENTS: Anions - all RPD's less than 10% or NA (in case of >DL)  
CN (total) - all RPD's acceptable (< 7% or NA)  
GFAA - all duplicate results (MS/MSD) acceptable  
for both waters + soils

ACTION: none

sample # constituent value/qual

sample # constituent value/qual



RCRA LEVEL C QC

Name JA Lerch Date 12/30/90

QC Check: Blank Analysis

COMMENTS: Anions- nitrate contamination detected in several  
water blanks; all other anion blanks OK

CN- trace contamination detected in several soil blanks

GFAA- all blanks free of contamination

ACTION: qualify associated results as per OSM  
guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
699-55-55-073	nitrate	35.9 U			
699-55-55-098	nitrate	31.6 U			
699-55-55-101	CN	0.1 UJ			
699-55-57-125	CN	0.1 U			

RCRA LEVEL C QC

Name

JA Lerch

Date

12/30/90

QC Check:

Calibrations/Control Samples

COMMENTS:

Anions - all calibrations, verification stds. %R ok

CN (total) - all initial cal. data ok, LCS recoveries ok

GFAA - all calibration, control std %R ok

ACTION:

NONE

sample # constituent value/qual

sample # constituent value/qual

## RCRA LEVEL C QC

Name JA Lerch Date 12/30/20QC Check: Other

COMMENTS: -free CN analysis not run because  
all total CN results were < 2ppm  
-see table below for sample ID's matrix

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

WHC ID	PNL ID	matrix
699-55-55-050	90-5356	soil
699-55-55-048	90-5357	water
699-55-55-050A	90-5358	water
699-55-55-075	90-6704	soil
699-55-55-073	90-6705	water
699-52-57-101.5	90-6707	soil
699-55-55-075A	90-6706	water
699-55-55-101	90-6708	soil
699-55-55-098	90-6709	water
699-55-55-125	90-6710	soil
699-55-55-125A	90-6711	soil
699-52-57-128	90-6712	soil
699-52-57-125	90-6713	water
699-52-57-153	90-6714	soil
699-55-55-150	90-6715	soil

6 of 6

## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, and tritium. Weight percent solid was also determined for soil samples. All data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 15) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie

B. M. Gillespie  
200-BP-1 Project Manager

12-17-90

Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPJP ALO-001.

J. L. Daniel

J. L. Daniel  
PNL ACL Quality Representative

12/17/90

Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
699-52-55-050	90-5356	Soil
699-55-55-048	90-5357	Water
699-55-55-050A	90-5358	Water
699-55-55-075	90-6704	Soil
699-55-55-073	90-6705	Water
699-55-55-075A	90-6706	Water
699-52-57-101.5	90-6707	Soil
699-55-55-101	90-6708	Soil
699-55-55-098	90-6709	Water
699-55-55-125	90-6710	Soil
699-55-55-125A	90-6711	Soil
699-52-57-128	90-6712	Soil
699-52-57-125	90-6713	Water
699-52-57-153	90-6714	Soil
699-55-55-150	90-6715	Soil

## INORGANIC DATA TABLES

TABLE 2:  
WEIGHT PERCENT SOLIDS SUMMARY SHEET

SAMPLE ID#	PNL LOG#	SAMPLE WT %	DUPLICATE WT %	AVERAGE SOLIDS WT %
-----	-----	-----	-----	-----
699-55-55-050	90-5356	96.67	96.03	96.35
699-55-55-075	90-6704	96.80	96.82	96.81
699-552-57-101.5	90-6707	96.70	96.48	96.59
699-55-55-101	90-6708	95.55	95.83	95.69
699-55-55-125	90-6710	96.42	96.48	96.45
699-55-55-125-A	90-6711	97.11	97.50	97.31
699-52-57-128	90-6712	97.20	97.38	97.29
699-52-57-153	90-6714	97.53	97.69	97.61
699-55-55-150	90-6715	96.05	96.11	96.08

\* Weight Percent Solids were determined following the method outlined in PNL-ALO-504.



### ANION ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. The sample solution was then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis was performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte. Data results are reported as dry weight (i.e. converted from weight % solids).

The mean % spike recoveries and their standard deviations (SD) are as follows:

	<u>SAMPLE + SPIKE</u>					<u>BLANK + SPIKE</u>		
	<u>SOILS</u>			<u>WATER</u>		<u>SOIL AND WATER</u>		
	<u>REC</u>	<u>±</u>	<u>SD (%)</u>	<u>REC</u>	<u>±</u>	<u>REC</u>	<u>±</u>	<u>SD (%)</u>
NO2-N	100.3		1.4	109.4		9.5	107.4	9.4
NO3-N	99.7		1.3	102.6		2.9	103.0	3.2
PO4-P	84.0		2.7	92.7		6.2	96.3	4.4
SO4	98.7		2.7	101.8		2.5	102.0	1.7

Upon review of the nitrate and sulfate soil analysis of duplicates a mean and standard deviation of the RPD's of the duplicate values are:

	<u>Mean(%)</u>	<u>±</u>	<u>Std dev(%)</u>
NO3-N	4.7		4.0
SO4	6.0		2.5

The values varied due to heterogeneity of sample matrix. Only one nitrate water analysis of duplicates was above detection limits and the RPD was 0. The concentration of the other soil analytes and all other analytes for water samples, was below the detection limits, therefore a relative percent difference is not calculated.

The hold times for water analysis of anions is 48 hours from sampling to the time of analysis. Hold times on water samples were met. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

TABLE 3: ANION IC ANALYSIS DATA

NITRITE (NO<sub>2</sub>-N)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-52-57-077-B*	90-5351	<DL	<DL	NA	<DL	24.0	23.4	23.7	23.7	102.6	100.0	101.3
699-55-55-50	90-5356	<DL		NA								
699-55-55-075	90-6704	<DL		NA								
699-52-57-101.5	90-6707	<DL		NA								
699-55-55-101	90-6708	<DL	<DL	NA		23.6	23.5			100.4		
699-55-55-125	90-6710	<DL		NA								
699-55-55-125A	90-6711	<DL	<DL	NA	<DL	23.2	23.5	22.6	22.5	98.7	100.4	99.3
699-52-57-128	90-6712	<DL		NA								
699-52-57-153	90-6714	<DL	<DL	NA		23.4	23.0			101.7		
699-55-55-150	90-6715	<DL		NA								
mean										100.3	(C3 and C6)	
std. dev.										1.4		

DL = Detection limit of 0.2 mg/Kg

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-55-55-048	90-5357	<DL	<DL	NA		1780	1520			117.1		
699-55-55-050A	90-5358	<DL	<DL	NA	<DL	1670	1520	1800	1520	109.9	118.4	107.2
699-55-55-073	90-6705	<DL	<DL	NA	<DL	1630	1520	1750	1520	107.2	115.1	113.8
699-55-55-075A	90-6706	<DL	<DL	NA		1900	1510			125.8		125.0
699-55-55-098	90-6709	<DL	<DL	NA	<DL	1510	1530	1550	1520	98.7	102.0	100.7
699-52-57-125	90-6713	<DL	<DL	NA	<DL	1520	1520	1510	1520	100.0	99.3	102.0
mean										109.4	(C3 and C6)	
std. dev.										9.5		

DL = Detection Limit of 14.9 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

TABLE 3: ANION IC ANALYSIS DATA

## NITRATE (NO3-N)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-52-57-077-B*	90-5351	0.9	0.9	1.1	<DL	18.3	17.4	18.1	17.6	99.9	97.6	99.1
699-55-55-50	90-5356	0.4		NA								
699-55-55-075	90-6704	0.5		NA								
699-52-57-101.5	90-6707	0.4										
699-55-55-101	90-6708	0.8	0.7	9.0		18.3	17.4			100.7		
699-55-55-125	90-6710	0.5										
699-55-55-125A	90-6711	0.5	0.5	4.2	<DL	17.7	17.4	17.2	16.7	99.0	100.1	100.0
699-52-57-128	90-6712	0.5										
699-52-57-153	90-6714	<DL	0.4	NA		17.5	17.1			101.1		
699-55-55-150	90-6715	0.5										
DL = detection limit of 0.2 mg/Kg												
										mean	99.7	
										std. dev.	1.3	

DL = detection limit of 0.2 mg/Kg

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES			
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE	
699-55-55-048	90-5357	<DL	<DL	NA		1200	1130			106.3			
699-55-55-050A	90-5358	<DL	35.0	NA	35.2	1210	1130	1200	1130	105.5	104.6	108.0	
699-55-55-073	90-6705	35.9 U	35.9	0.0	<DL	1140	1130	1180	1130	97.7	101.2	104.4	
699-55-55-075A	90-6706	<DL	<DL	NA		1190	1120			106.3		105.3	
699-55-55-098	90-6709	31.6 U	<DL	NA	31.6	1160	1130	1140	1130	101.3	99.5	103.6	
699-52-57-125	90-6713	<DL	35.5	NA	85.6	1170	1130	1170	1130	102.0	102.0	100.9	
DL = detection limit of 14.9 ug/L										mean	102.6	(C3 and C6)	103.0 **
										std. dev.	2.9		3.2

DL = detection limit of 14.9 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

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TABLE 3: ANION IC ANALYSIS DATA

## PHOSPHATE (PO4-P)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		C3 SAMPLE + SPIKE	% RECOVERIES	
		SAMPLE (mg/Kg)	DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)		C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-52-57-077-B*	90-5351	<DL	<DL	NA	<DL	20.9	25.1	21.8	25.3	83.3	86.2	92.6
699-55-55-50	90-5356	<DL										
699-55-55-075	90-6704	<DL										
699-52-57-101.5	90-6707	<DL										
699-55-55-101	90-6708	<DL	<DL	NA		21.0	25.2			83.3		
699-55-55-125	90-6710	<DL										
699-55-55-125A	90-6711	<DL	<DL	NA	<DL	20.5	25.2	19.7	24.1	81.3	81.7	90.8
699-52-57-128	90-6712	<DL										
699-52-57-153	90-6714	<DL	<DL	NA		21.7	24.6			88.2		
699-55-55-150	90-6715	<DL										
DL = detection limit of 0.6 mg/Kg										mean	(C3 and C6)	
										std. dev.	2.7	

DL = detection limit of 0.6 mg/Kg

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		C3	% RECOVERIES	
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-55-55-048	90-5357	<DL	<DL	NA		1630	1620			100.6		
699-55-55-050A	90-5358	<DL	<DL	NA	<DL	1510	1630	1660	1630	92.6	101.8	101.8
699-55-55-073	90-6705	<DL	<DL	NA	<DL	1370	1630	1500	1630	84.0	92.0	95.7
699-55-55-075A	90-6706	<DL	<DL	NA		1590	1620			98.1		101.2
699-55-55-098	90-6709	<DL	<DL	NA	<DL	1420	1640	1530	1630	86.6	93.9	98.8
699-52-57-125	90-6713	<DL	<DL	NA	<DL	1390	1630	1500	1630	85.3	92.0	93.2
mean										92.7	(C3 and C6)	
std. dev.										6.2	4.4	
DL = detection limit of 60 ug/L												

DL = detection limit of 60 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

TABLE 3: ANION IC ANALYSIS DATA

## SULFATE (SO4)

## SOLID SAMPLES

SAMPLE ID#	PHL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-52-57-077-B*	90-5351	13.3	13.3	0	<DL	87.5	76.9	87.6	77.7	96.5	95.6	101.6
699-55-55-50	90-5356	8.2										
699-55-55-075	90-6704	17.8										
699-52-57-101.5	90-6707	5.4										
699-55-55-101	90-6708	15.2	13.9	8.9		90.7	77.2			98.6		
699-55-55-125	90-6710	21.3										
699-55-55-125A	90-6711	16.1	15.4	4.4	<DL	95.5	77.2	88.9	74.0	103.3	98.9	100.6
699-52-57-128	90-6712	4.4										
699-52-57-153	90-6714	4.9	5.2	4.6		80.0	75.6			99.2		
699-55-55-150	90-6715	26.7										
mean										98.7	(C3 and C6)	
std. dev.										2.7		

DL = detection limit of 3.8 mg/Kg (theoretical)

## WATER SAMPLES

SAMPLE ID#	PHL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
699-55-55-048	90-5357	<DL	<DL	NA		5200	4980			104.4		
699-55-55-050A	90-5358	<DL	<DL	NA	<DL	5200	5000	5240	4990	104.0	105.0	104.4
699-55-55-073	90-6705	<DL	<DL	NA	<DL	4940	5000	5160	5010	98.8	103.0	102.6
699-55-55-075A	90-6706	<DL	<DL	NA		5190	4970			104.4		103.8
699-55-55-098	90-6709	<DL	<DL	NA	<DL	4990	5020	4990	5000	99.4	99.8	101.0
699-52-57-125	90-6713	<DL	<DL	NA	<DL	4990	4990	4950	4980	100.0	99.4	99.8
mean										101.8	(C3 and C6)	
std. dev.										2.5		

DL = detection limit of 250 ug/L

Notes: RPD only calculated when both sample and duplicate results are &gt;DL.

\* 90-5351 is not a sample in this sample delivery group but is reported for QC purposes.

\*\* Both the water and soil % recovery results were incorporated in the mean for blank spikes.

### CYANIDE ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-270, Total Cyanide in Waters, Solids or Sludges. The methodology is comparable to CLP SOW 788 Method 335.2 distillation and colorimetric technique for the analysis of cyanide. The analysis was performed in building 3720 in the 300 area.

The procedure, PNL-ALO-270, did not reflect the correct CLP standard preparation guidelines (section 7.3.2.1 and 7.4.2.1). The analysts made a deviation to the procedure and used the client requested method, CLP SOW (788), method 335.2, for the standard preparation (page D-76). An Interim Change Notice (ICN) or revision to the procedure will be written.

During the analysis samples, the KCN spike solution was found to be 80% of the specified CLP procedure requirements by titration with  $\text{AgNO}_3$ . New KCN solution was prepared for subsequent batches.

The sample results were below the client required detection limits of 10  $\mu\text{g/L}$  and 1  $\text{mg/Kg}$ . Sample results are all below 2 ppm; therefore free cyanide analysis was not required.

Upon review of the sample spiked data results, for soils results, the mean recovery is 98.2% with a standard deviation of 3.3% and for water results the mean recovery is 101.3% with a standard deviation of 3%. The spiked blank results mean recovery is 100% with a standard deviation of 3.7%. The conclusion is an average standard deviation of  $\pm 4\%$  and a bias of 0% on the average.

The general Environmental Protection Agency (EPA) hold time for total cyanide is 12 days. The hold time was not met. The delay in work is attributed internal logistics problems with Radiation Protection Technology

(RPT). There is no known impact on the results of the late analysis dates of the soil and water samples as they are below the detection limits and are preserved in basic media. The LCS standards were acquired from EPA in April of 1990 (six months prior to analysis) and are in basic media and produce satisfactory recoveries (mean of 97%); therefore the late analyses of the samples is unlikely to have any impact on the results.



TABLE 4: TOTAL CYANIDE ANALYSIS DATA

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#			RPD	G5 BLANK (ug)	G3		G6		% RECOVERIES		
		G1 SAMPLE (mg/Kg)	G2 SAMPLE DUP (mg/Kg)			SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	BLANK+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 BLANK+ SPIKE	LCS SAMPLE
699-55-55-050	90-5356 (a)	<DL	UJ 0.1	NA	0.5	7.67	8.32	8.2	8.3	92.2	99.6	95.8
699-55-55-075	90-6704 (b)	<DL	UJ <DL	NA	<DL	9.52	9.94	8.9	9.9	95.8	91.5	100.2
699-52-57-101.5	90-6707 (c)	<DL	UJ <DL	NA	0.1	10.29	10.18	10.19	10.18	101.1	101.8	106.6
699-55-55-101	90-6708 (d)	0.1	UJ 0.2	7	0.3	10.43	10.10	9.6	10.1	103.2	97.6	88.7
699-55-57-125	90-6710 (e)	0.1	UJ 0.1	0	0.4	9.75	9.99	9.99	9.99	97.6	98.6	106.4
699-52-57-125A	90-6711 (b)	<DL	UJ <DL	NA	<DL	9.92	10.00	9.9	10	99.1	98.1	107.4
699-52-57-128	90-6712 (b)	<DL	UJ <DL	NA	<DL	9.18	9.26	8.99	9.26	99.1	98.1	91.4
699-52-57-153	90-6714 (d)	<DL	UJ <DL	NA	<DL	9.68	9.67	9.68	9.67	100.1	101.9	89.6
699-55-55-150	90-6715 (d)	<DL	UJ <DL	NA	<DL	8.29	8.68	10.29	8.68	95.5	102.7	91.9
mean										98.2	98.9	97.6
std. dev.										3.3	3.4	7.7

## WATER SAMPLES

SAMPLE ID#	PNL LOG#			RPD	G5 BLANK (ug)	G3		G6		% RECOVERIES		
		G1 SAMPLE (ug/L)	G2 SAMPLE DUP (ug/L)			SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	BLANK+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 BLANK+ SPIKE	LCS SAMPLE
699-55-55-048	90-5357 (a)	1.5	J 1.8	5.5	<DL	38.8	39.82	38.8	39.82	97.5	98.33	90.5
699-55-55-050A	90-5358 (a)	<DL	UJ <DL	NA	<DL	38.76	39.82	38.76	39.82	97.3	98.22	94.7
699-55-55-073	90-6705 (a)	<DL	UJ <DL	NA	<DL	41.07	39.82	41.07	39.82	103.2	103.76	101.9
699-55-55-075A	90-6706 (c)	<DL	UJ <DL	NA	<DL	42.66	39.82	42.66	39.82	107.1	105.79	98.7
699-55-55-098	90-6709 (f)	<DL	<DL	NA	<DL	40.97	39.82	40.97	39.82	102.9	103.79	99.4
699-52-57-125	90-6713 (f)	<DL	<DL	NA	<DL	47.52	47.78	47.52	47.78	99.5	105.21	96.9
mean										101.3	102.5	97.0
std. dev.										3.8	3.4	4.0

Detection limits for water = 1 ug/L

Detection limits for soil = 0.1-0.4 mg/Kg (theoretical)

- (a) Hold time missed by 6 days.  
 (b) Hold time missed by 5 days.  
 (c) Hold time missed by 4 days.  
 (d) Hold time missed by 3 days.  
 (e) Hold time missed by 1 day.  
 (f) Hold time missed by 2 days.

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FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 ppm, therefore free cyanide analysis was not performed on the samples in this set.

Table 5: Free Cyanide Analysis Data

No data necessary.

## GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestates were then analyzed by graphite furnace atomic absorption (GFAAS) following procedure PNL-ALO-215, Selenium (Atomic Absorption, Furnace Method), for selenium and PNL-ALO-216, Bismuth (Atomic Absorption, Furnace Technique), for bismuth. Se and Bi analysis methodologies are consistent with CLP SOW 788 Method 270.2. Digestion of samples was performed in building 325 and analysis by GFAAS was conducted in building 325.

Analysis for Se and Bi was conducted on a Perkin-Elmer 5100/HGA 600 (not equipped with a Zeeman background correction device). The quarterly instrument detection limit (IDL) for Se was found to be 1.3  $\mu\text{g/L}$ . The corresponding IDL for Bi was found to be 4.3  $\mu\text{g/L}$ .

A preliminary analysis of the samples was performed to determine the dilution factor necessary to bring the concentration to mid-range in the calibration curve. All samples were determined to have Se and Bi levels below the respective detection limits 3.25  $\mu\text{g/L}$  and 10.75  $\mu\text{g/L}$ . Detection limit was defined as 2.5 times the IDL.

The data are reported in Table 6 for selenium results and Table 7 for bismuth results. Each table has a summary results table followed by batch results tables for easy verification of control standards and quality control samples analyzed per batch.

Upon review of the data tables for selenium (Table 6) and bismuth (Table 7), the average recovery of selenium spike in waters is 95.4% with a

standard deviation of 6.9%, the average recovery of selenium spike in soils is 75.3% with a standard deviation of 35.6%, the average recovery of bismuth spike in waters is 102.7% with a standard deviation of 5.3% and the average recovery of bismuth spike in soils is 89.9% with a standard deviation of 10.5%. A precision determined from the duplicate sample analysis is not possible since the results are below detection limits. Therefore, the overall precision and bias based on spike recovery information for all spike samples associated with this set of data are as follows:

	<u>Ave % Rec</u>	<u>Ave % Bias</u>	<u>Std Dev of Rec</u>
Selenium in water	95.4	-5	6.9
Selenium in soil	75.3	-25	35.6
Bismuth in water	102.7	+3	5.3
Bismuth in soil	89.9	-10	10.5

The large bias and poor precision associated with the analysis of selenium in soil samples is attributed to the low concentrations of selenium and spike standard in the samples and matrix interference (of iron) in the samples. The matrix interference of iron interferes in the background determination in selenium analysis. A Zeeman background correction attachment is necessary for this matrix correction. The data in Tables 6 and 7 are flagged with appropriate CLP (as defined in CLP SOW 7/88, pages B-19 and 20) flags where necessary. ICB, CCB, ICV, CRA, etc. are as defined in the CLP SOW 7/88, section E.

The CLP SOW 788 specified hold time of 180 days was met as well as the contract required hold time of 120 days.

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TABLE 7: BISMUTH ANALYSIS DATA  
ACID EXTRACTABLE BISMUTH IN SAMPLES

SOLID SAMPLES

SAMPLE ID#	PNL LOG# (a)	B1		B2		RPD (c)	B5 BLANK (ug)	B3		B6		% RECOVERIES		
		SAMPLE	Spike	SAMPLE DUP	Spike			SPIKE+SAMPLE	SPIKE	BLANK+SPIKE	SPIKE	B3 SAMPLE + SPIKE	B6 BLANK+ SPIKE	B4 LCS (d) SAMPLE
		(ug/Kg)	% Rec	(mg/Kg)	% Rec			(ug/L)	(ug/L) (b)	(ug/L)	(ug/L) (b)			
699-55-55-050	90-5356	<IDL	UJ	<IDL			<IDL	<IDL	50	<IDL	50	4	4	89
699-55-55-050	90-5356-AS	18	87	13.5	65	28.6		21.2	20	16.9	20	96	74	
699-55-55-075	90-6704	<IDL	UJ											
699-55-55-075	90-6704-AS	18.9	95											
699-52-57-101.5	90-6707	<IDL	UJ											
699-52-57-101.5	90-6707-AS	18.7	95											
699-55-55-101	90-6708	<IDL	UJ											
699-55-55-101	90-6708-AS	19.1	96											
699-55-55-125	90-6710	<IDL	UJ											
699-55-55-125	90-6710-AS	18.9	95											
699-55-55-125-A	90-6711	<IDL	UJ											
699-55-55-125-A	90-6711-AS	19.2	97											
699-52-57-128	90-6712	<IDL	UJ											
699-52-57-128	90-6712-AS	19.6	99											
699-52-57-153	90-6714	<IDL	UJ											
699-52-57-153	90-6714-AS	18.8	95											
699-55-55-150	90-6715	<IDL	UJ											
699-55-55-150	90-6715-AS	16.8	85											

WATER SAMPLES

SAMPLE ID#	PNL LOG# (a)	B1		B2		RPD (c)	B5 BLANK (ug)	B3		B6		% RECOVERIES		
		SAMPLE	Spike	SAMPLE DUP	Spike			SPIKE+SAMPLE	SPIKE	BLANK+SPIKE	SPIKE	B3 SAMPLE + SPIKE	B6 BLANK+ SPIKE	B7 SPIKE BLANK
		(ug/L)	% Rec	(ug/L)	% Rec			(ug/L)	(ug/L) (b)	(ug/L)	(ug/L) (b)			
699-55-55-048	90-5357	<DL												
699-55-55-048	90-5357-AS	20.4	102											
699-55-55-050-A	90-5358	<DL												
699-55-55-050-A	90-5358-AS	19.7	98											
699-55-55-073	90-6705	<DL		<DL			<DL	48.2	50	49.2	50	96	98	90
699-55-55-073	90-6705-AS	20	98	21.4	107	6.8								
699-55-55-075-A	90-6706	<DL												
699-55-55-075-A	90-6706-AS	21.5	108											
699-55-55-098	90-6709	<DL												
699-55-55-098	90-6709-AS	21.5	108											
699-52-57-125	90-6713	<DL												
699-52-57-125	90-6713-AS	21.9	109											

Instrument Detection Limits (IDL) for water = 2.9 ug/L

Method Detection Limit (DL) for water = IDL x 2.5 = 7.25 ug/L

Contract Required Detection Limit (CRDL) = 60 ug/L

Instrument Detection Limit (IDL) for soil in solution = 4.3 ug/L = 0.3 mg/Kg (calculated using average sample size of 1.5 g)

Method Detection Limit (DL) for soils in solution = IDL x 2.5 = 10.75 ug/L = 0.72 mg/Kg (calculated using average sample size of 1.5 g)

Contract Required Detection Limit (CRDL) = 10 ug/g (10 mg/Kg)

(a) Analytical Spike (AS) = 20 ug/L

(b) Pre-digest spike = 50 ug/l

(c) RPD only calculated if both sample and duplicate are greater than detection limit.

(d) B4 = LCS-0287 + 40 ug Bi spike

TABLE 6: SELENIUM ANALYSIS DATA  
ACID EXTRACTABLE SELENIUM IN SAMPLES

SOLID SAMPLES

SAMPLE ID#	PNL LOG# (a)	B1		B2		RPD (c)	B5 BLANK (ug)	B3		B6		% RECOVERIES		
		SAMPLE	Spike % Rec	SAMPLE DUP	Spike % Rec			SPIKE+SAMPLE (ug/L)	SPIKE (ug/L) (b)	BLANK+SPIKE (ug/L)	SPIKE (ug/L) (b)	B3 SAMPLE + SPIKE	B6 BLANK+ SPIKE	B4 LCS SAMPLE
699-55-55-050	90-5356	<IDL	WT	<IDL	WT		<IDL	<IDL	25.00	<IDL	25	0	0	106
699-55-55-050	90-5356-AS	4.8	119	4.4	116	8.7	11.0	6.8	10	7.3	10	122	123	
699-55-55-075	90-6704	<IDL	WT											
699-55-55-075	90-6704-AS	3.4	41											
699-52-57-101.5	90-6707	<IDL	WT											
699-52-57-101.5	90-6707-AS	3.7	39											
699-55-55-101	90-6708	<IDL	WT											
699-55-55-101	90-6708-AS	4.1	43											
699-55-55-125	90-6710	<IDL	WT											
699-55-55-125	90-6710-AS	4.1	48											
699-55-55-125-A	90-6711	<IDL	WT											
699-55-55-125-A	90-6711-AS	3.4	36											
699-52-57-128	90-6712	<IDL	WT											
699-52-57-128	90-6712-AS	4.4	76											
699-52-57-153	90-6714	<IDL	WT											
699-52-57-153	90-6714-AS	4.3	70											
699-55-55-150	90-6715	<IDL	WT											
699-55-55-150	90-6715-AS	2.0	70											

*JJ* 12/30/90

WATER SAMPLES

SAMPLE ID#	PNL LOG# (a)	B1		B2		RPD (c)	B5 BLANK (ug)	B3		B6		% RECOVERIES		
		SAMPLE	Spike % Rec	SAMPLE DUP	Spike % Rec			SPIKE+SAMPLE (ug/L)	SPIKE (ug/L) (b)	BLANK+SPIKE (ug/L)	SPIKE (ug/L) (b)	B3 SAMPLE + SPIKE	B6 BLANK+ SPIKE	B4 LCS SAMPLE
699-55-55-048	90-5357	<DL												
699-55-55-048	90-5357-AS	10.2	102											
699-55-55-050-A	90-5358	<DL												
699-55-55-050-A	90-5358-AS	9.0	85											
699-55-55-073	90-6705	<DL		<DL			<DL	22.3	25	21.4	25	89	86	93
699-55-55-073	90-6705-AS	9.8	101	9.9	97	1.0	10.3							
699-55-55-075-A	90-6706	<DL												
699-55-55-075-A	90-6706-AS	9.8	98											
699-55-55-098	90-6709	<DL												
699-55-55-098	90-6709-AS	9.9	99											
699-52-57-125	90-6713	<DL												
699-52-57-125	90-6713-AS	10.2	102											

Instrument Detection Limits (IDL) for water = 1.5 ug/L  
 Method Detection Limit (DL) for water = IDL x 2.5 = 3.75 ug/L  
 Contract Required Detection Limit (CRDL) = 5 ug/L  
 Instrument Detection Limit (IDL) for soil in solution = 1.3 ug/L = 0.1 mg/Kg (calculated using average sample size of 1.5 g)  
 Method Detection Limit (DL) for soils in solution = IDL x 2.5 = 3.25 ug/L = 0.22 mg/Kg (calculated using average sample size of 1.5 g)  
 Contract Required Detection Limit (CRDL) = 0.5 ug/g (0.5 mg/Kg)

(a) Analytical Spike (AS) = 10 ug/L  
 (b) Pre-digest spike = 25 ug/l for B3, B4 and B6  
 (c) RPD only calculated if both sample and duplicate are greater than detection limit.



**B1 - WESTINGHOUSE CHAIN OF CUSTODY,  
SAMPLE ANALYSIS REQUEST FORMS  
AND PNL SAMPLE RECEIPT FORMS**

**B01-001**

SAMPLE RECEIPT FORM

Delivered by: R. STEFFER Date/Time: 10/11/90 - 1300 HRS

Received by: MIKE URIE

Customer Sample Number(s): 699-55-55-050

ALO Sample Number(s): 90-5356

1. Customer Chain-of-Custody Form: Present ✓ Absent \_\_\_\_\_
2. Additional Shipping Forms (list): RAS & Request For Analysis
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ✓ Absent \_\_\_\_\_  
If Present, Condition: Good
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial. N/A
- Notes:
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). OK
6. Condition of Sample Vials. OK
7. Verification of Agreement or Nonagreement of Information on Receiving Documents. Agree
8. Resolution of Problems or Discrepancies. N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-002

SAMPLE RECEIPT FORM

Delivered by: R. STEFFLER Date/Time: 10/11/90 1300 Hrs

Received by: MIKE URE

Customer Sample Number(s): 699-55-55-048

ALO Sample Number(s): 90-5357

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐
2. Additional Shipping Forms (list): RAS & REQUEST FOR ANALYSIS
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent ☐  
If Present, Condition: OK
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.  
Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). OK
6. Condition of Sample Vials. OK
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.  
AGREE
8. Resolution of Problems or Discrepancies.  
N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-003

SAMPLE RECEIPT FORM

Delivered by: R. STEFFLER Date/Time: 10/11/90 1300 Hrs

Received by: MIKE URIG

Customer Sample Number(s): 699-55-55-650A

ALO Sample Number(s): 90-5358

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐
2. Additional Shipping Forms (list): RAS & REQUEST FOR ANALYSIS
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent ☐  
If Present, Condition: OK
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.  
Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). OK
6. Condition of Sample Vials. OK
7. Verification of Agreement or Nonagreement of Information on Receiving Documents. AGREE
8. Resolution of Problems or Discrepancies.  
N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

EO1-004

Westinghouse Hanford  
Company

# CHAIN OF CUSTODY

Company Contact: WENDY S. THOMPSON Telephone: (509) 373-3818  
Sample Collected by: W.S. THOMPSON Date: 10/11/90 Time: 0845; 0800; 0850  
Sample Locations: WS THOMPSON 10/11/90 699-55-55; WALSITE IN 600 AREA; NORTH OF 300 EAST  
Ice Chest No.: SLEEPY POLY COOLER Field Logbook and Page No.: WHC-N-287-2 pg 46-48  
Remarks: SAMPLES COLLECTED FOR ANALYSIS OF PARAMETERS OF INTEREST SUPPORTING THE 200-BP-1 RI/FS. (SEE STATEMENT OF WORK & WORKPLAN DOE/RI 88-32)  
Bill of Lading No.: NA Offsite Property No.: NA  
Method of Shipment: HAND CARRY SAME DAY TO 325 PNL LAB BY ASL SAMPLE VAN.  
Shipped to: 325 PNL LABORATORY (300 AREA)  
Possible Sample Hazards: NONE INDICATED WITH FIELD INSTRUMENTS.  
(KEEP CHILLED ON ICE DURING TRANSPORTATION)

## Sample Identification

- 1) 699-55-55-050  
2, 1-liter, glass (1/2 full AS REQUESTED BY LAB.); ANALYSIS OF 200-BP-1 PARAMETERS OF INTEREST
- 2) 699-55-55-048  
1, 500 ml., glass, water; chemical analysis of ANIONS & TRITIUM  
1-liter, glass; water; 2ml. NaOH; analysis of CN & FREE CYANIDE  
3, 1-liter, glass; water; 2ml. HNO<sub>3</sub>; analysis of metals & radiochemical analysis } Parameters of Interest
- 3) 699-55-55-050A  
1, 500 ml., glass; water; chemical analysis of ANIONS & TRITIUM  
3, 1-liter, glass; water; 2ml. NaOH; analysis of CN & FREE CYANIDE  
3, 1-liter, glass; water; 2ml. HNO<sub>3</sub>; analysis of metals & radiochemical analysis } Parameters of Interest
- WST

## Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>R. J. Still</u> <u>R. J. Still</u>	Date/Time: <u>10/11/90 0955 WST</u> <u>10/11/90 +0555 hours</u>
Relinquished by: <u>R. J. Still</u> <u>R. J. Still</u>	Received by: <u>[Signature]</u>	Date/Time: <u>10/11/90 12:55</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-0015

A-5000-407 (04/90)



## PART I: FIELD SECTION

Date Sampled 10/11/90 Time 0845 hours

Telephone 509 1.373-3818 <sup>0800</sup>  
<sub>0850</sub>

200-BP-1 Parameters of Interest

[illegible]

Field Information\*\* Samples sent to 325 PNL Lab for analysis by 2003-1

RI/ES Parameters of Interest (see statement of work)

no hazards indicated by field instruments

Special Handling and/or Storage Keep chilled

## PART II: LABORATORY SECTION

Received by

**Title**

Date \_\_\_\_\_

### Analysis Required

Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

BOI-006

SAMPLE RECEIPT FORM

Delivered by: Stephler Date/Time: 10/15/90 11:25  
Received by: M. L. Me 075A  
Customer Sample Number(s): 69-50-538-225, 69-55-55-075-073-074A 8m10  
ALO Sample Number(s): 90-6703, 90-6704, 90-6705, 90-6706 12-11-90

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_  
2. Additional Shipping Forms (list):  
RSR  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent \_\_\_\_\_

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

ICED

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents

Agree with

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-007

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W. S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson / R.Z. Stoff Date 10/12/90 Time 1335  
Sample Locations 199-50-53B well site  
Ice Chest No. WST 1012150 MO-OT Epsilon #5 Field Logbook and Page No. WHC-N-287-2p. 52-53  
Remarks Sample to be analyzed for TOC (Total Organic Carbon)  
via 200-BP-1 RT / FS.  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry to 325 PNL LAB (300 AREA)  
Shipped to 325 PNL LAB.  
Possible Sample Hazards none indicated with field instruments

Sample Identification

199-50-53B-225 200-BP-1  
1, 120 ml amber glass, soil, analysis of Total Organic Carbon (TOC)

Chain of Possession

Relinquished by: <u>W. S. Thompson</u> <u>Kendy Thompson</u>	Received by: <u>R.Z. Stoff</u> <u>R.Z. Stoff</u>	Date/Time: <u>10/12/90 1350 hrs.</u>
Relinquished by: <u>R.Z. Stoff</u>	Received by: <u>M.W. Th...</u>	Date/Time: <u>10/15/90 11:25</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-008

A-6000-407 (04/90)





## PART I: FIELD SECTION

Date Sampled 10/12/90 Time 1335 hours

Telephone (609) 373-3848

2050P-1

[illegible]

Field Information\*\* Samples to be analyzed for Total organic Carbon (TOC)  
200-BP-1 RI/FS.

Special Handling and/or Storage Keep sealed

## PART II: LABORATORY SECTION

**Received by**

**Title**

Date \_\_\_\_\_

### Analysis Required

**Indicate whether sample is soil, sludge, water, etc.**

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

EO 1.1-0000

Westinghouse Hanford  
Company

# CHAIN OF CUSTODY

Company Contact: Wendy S. Thompson Telephone: (509) 373-3818  
 Sample Collected by: W.S. Thompson / RZ Steffen Date: 10/15/90 Time: 0750, 0835, 0845  
 Sample Locations: 1099-55-55 wellsite, North of 200 EAST  
 Ice Chest No.: "Epsilon" #5 polycarbonate Field Logbook and Page No.: WHC-N-287-2 pg. 56  
 Remarks: Samples to be analyzed for 200-BP-1. Parameters of interest  
See statement of work  
 Bill of Lading No.: N/A Offsite Property No.: N/A  
 Method of Shipment: Hand carry, same day (prior to 1:00 pm) by ASL Sample  
 Shipped to: 325 PNL LABORATORY (300 AREA) run  
 Possible Sample Hazards: none indicated with field instruments

## Sample Identification

① 699-55-55-073		
1, 500ml, clear glass, water, anions + tritium		
3, 1-liter, amber glass, water, 2ml NaOH, CN + Free CN		
3, 1-liter, amber glass, water, 2ml HNO <sub>3</sub> , metals + radiochemicals.		
② 699-55-55-075		
2, 1-liter, clear glass, Soil, (1/2 full, no requested by lab)		
③ 699-55-55-075A		
1, 500ml, clear glass, water, anions + tritium		
3, 1-liter, amber glass, water, 2ml NaOH, CN + Free CN		
3, 1-liter, amber glass, water, 2ml HNO <sub>3</sub> , metals + radiochemicals.		

All SAMPLES  
 TO BE  
 ANALYZED  
 FOR  
 200-BP-1  
 PARAMETERS  
 OF  
 INTEREST  
 (See statement  
 of work.)

## Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>RZ Steffen</u> <u>R. Z. Steffen</u>	Date/Time: <u>10/15/90</u> <u>0915 hrs.</u>
Relinquished by: <u>R. Z. Steffen</u>	Received by: <u>M. W. Min</u>	Date/Time: <u>10/15/90</u> <u>11:25</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W.S. Thompson / R.Z. STEFFER

Date Sampled 10/15/90 Time 0750 hours

Company Contact Wendy S. Thompson

Telephone (509) 373-3818 <sup>0835</sup>  
<sub>0845</sub>

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
① 699-55-55-073	1, 500 ml, clear glass	water, anions & tritium	(200-BP-1 parameters of interest see statement of work)
	3, 1-liter, amber glass	water, 2ml NaOH; CN & Free CN	
	3, 1-liter, amber glass	water, 2ml HNO <sub>3</sub> ; metals & radiochemical	
② 699-55-55-075	2, 1-liter, clear glass; soil; (1/2 full, lab requested)		ALL SAMPLES TO BE ANALYZED FOR 200-BP-1 PARAMETERS OF INTEREST (see statement of work)
③ 699-55-55-075A	1, 500 ml, clear glass	water, anions & tritium	
	3, 1-liter, amber glass	water, 2ml NaOH; CN & Free CN	
	3, 1-liter, amber glass	water, 2ml HNO <sub>3</sub> ; metals & radiochemicals	
WST			
WST			

Field Information\*\* SOIL & WATER SAMPLES TO BE ANALYZED FOR 200-BP-1 PARAMETERS OF INTEREST.

Special Handling and/or Storage SAME DAY DELIVERY, HAND CARRY, TO 325 PNL LABORATORY.  
NO HAZARDS INDICATED WITH FIELD INSTRUMENTS.

## PART II: LABORATORY SECTION

Received by MWTh

Title Group Leader

Date 10/15/90

Analysis Required

Indicate whether sample is soil, sludge, water, etc.

\*\* Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-011

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/16/90 12:15  
Received by: M W Lums  
Customer Sample Number(s): 699-52-52 -101.5  
ALO Sample Number(s): 90-6707

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_  
2. Additional Shipping Forms (list):  
RSR  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent \_\_\_\_\_

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

ICED!

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-012

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact Wendy S. Thompson Telephone (509) 373-3818  
Sample Collected by Wendy Thompson/R.Z. Steffler Date 10/16/90 Time 1045  
Sample Locations 699-52-57 weewete, North of 200 ERT (600 AREA)  
Ice Chest No. MD-1 Field Logbook and Page No. WHC-N-287-2 pg 58-59  
Remarks Samples to be analyzed for 200-BP-1 Parameters of Interest  
(see statement of work for this analysis)  
Bill of Lading No. N/A Offsite Property No. N/A  
Method of Shipment Hand carry, same day delivery  
Shipped to 325 PNL Laboratory (300 AREA)  
Possible Sample Hazards none indicated with field instruments

1) 699-52-57 - 101.5  
- 2.7 liter, clear, glass; soil; analysis of 200BP-1 Parameters of Interest  
(see statement of work)  
Sample Identification 90-6707

Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>W.S. Thompson</u>	Received by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Date/Time: <u>10/16/90</u> <u>1122</u>
Relinquished by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Received by: <u>MN Uric</u> <u>MN Uric</u>	Date/Time: <u>10/16/90</u> <u>12:15</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-013

A-6000-407 (04/90)



Westinghouse  
Hanford Company

## SAMPLE ANALYSIS REQUEST

### PART I: FIELD SECTION

Collector Wendy S. Thompson / R. Z. Steffler

Date Sampled 10/16/90 Time 1045 hours

Company Contact W. S. Thompson

Telephone (509) 373-3818

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
<u>199-52-57</u>	<u>101.5</u>		
<u>1, 2-</u>	<u>2, 1-liter, clear glass;</u>	<u>Soil;</u>	<u>analysis of 200-BP-1 Parameters of Interest</u>
	<u>10/16/90</u>		<u>(See Statement of work)</u>

Field Information\*\* Samples collected for analysis of Parameters of Interest  
Supporting the 200-BP-1 RI/FS.

Special Handling and/or Storage Keep samples on ice - same day delivery.  
No potential hazards indicated with field instruments.

### PART II: LABORATORY SECTION

Received by MTW/lu

Title Group Leader

Date 10/16/90

Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-014

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/17/90 10:02  
Received by: Chil  
Customer Sample Number(s): 699-55-55-101 699-55-55-098  
ALO Sample Number(s): 90-6708 90-6709

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_  
2. Additional Shipping Forms (list):  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent \_\_\_\_\_

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

- ICED  
6. Condition of Sample Vials.

- GOOD  
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

- AGREE  
8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson/R.F. Steffen Date 10/17/90 Time 0910, 0630  
Sample Locations 699-55-55 Well site, North of 200 EAST, (1000 AREA)  
Ice Chest No. "Alpha-4" polycooler Field Logbook and Page No. WMC-N-287-2 pg 60-62  
Remarks Samples to be analyzed for 200-BP-1 Parameters of Interest  
(see statement of work)  
Bill of Lading No. N/A Offsite Property No. N/A  
Method of Shipment hand carry; same day delivery in ASL sample van  
Shipped to 325 PNL LOU (300 AREA)  
Possible Sample Hazards none indicated with field instruments

Sample Identification

1) 699-55-55-101 90-6708  
1, 2-liter; clear, glass; soil; (1/2 full); analysis of 200BP-1 Parameters of Interest  
699-55-55-099 90-6708  
1, 500ml. clear, glass; water; anions + tritium } Parameters  
3, 1-liter; amber glass; water; 2ml. H<sub>2</sub>O<sub>2</sub>; metals + radiochemicals } of  
3, 1-liter; amber glass; water; 2ml NaOH; CN + Free CN } Interest

Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>R.F. Steffen</u> <u>R.F. Steffen</u>	Date/Time: <u>10/17/90 0900 hrs.</u>
Relinquished by: <u>R.F. Steffen</u> <u>R.F. Steffen</u>	Received by: <u>M.W. Ch...</u> <u>M.W. Ch...</u>	Date/Time: <u>10/17/90 10:02</u>
Relinquished by:	Received by:	Date/Time:

R01-016



SAMPLE RECEIPT FORM

Delivered by: Steffen Date/Time: 10/19/90 12:35  
Received by: Chen  
Customer Sample Number(s): 99-55-55-125, 125A <sup>soil</sup> 699-52-57-128, 125 <sup>soil water</sup>  
ALO Sample Number(s): 90-6710, 90-6711, 90-6712, 90-6713

1. Customer Chain-of-Custody Form: Present ☒ Absent
2. Additional Shipping Forms (list):  
RSR
3. Custody Request for Analysis Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent           
If Present, Condition: GOOD
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial,  
Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  
ICED
6. Condition of Sample Vials.  
GOOD
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.  
Agree
8. Resolution of Problems or Discrepancies. .  
N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-017

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 313-3818  
Sample Collected by W.S. Thompson / R.Z. Steffer Date 10/19/90 Time 1047, 1047  
Sample Locations 699-SS-SS Well site; North of 200-EST (200-BP-1)  
Ice Chest No. "SLEEPY" polycorder Field Logbook and Page No. WHC-N-287-2 pg. 66-68  
Remarks Samples to be analyzed for 200-BP-1 Parameters of Interest  
(see statement of work for 200-BP-1 RI/ES)  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry to 325 PNL LAB; same day delivery by ASL Sample  
Shipped to 325 PNL LAB rdm  
Possible Sample Hazards none indicated with field instruments

Sample Identification

- 1) 699-SS-SS-125 90-6710  
1, 2 liter, clear glass jar; soil; analysis of 200BP-1 Parameters of Interest
- 2) 699-SS-SS-125A 90-6711  
1, 2 liter, clear glass; soil; analysis of 200BP-1 Parameters of Interest

Chain of Possession

Relinquished by: <u>W.S. Thompson</u>	Received by: <u>R.Z. Steffer</u>	Date/Time: <u>10/19/90 1130</u>
Relinquished by: <u>R.Z. Steffer</u>	Received by: <u>W. Walker</u>	Date/Time: <u>10/19/90 12:35</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W.S. Thompson; R.E. Steffen

Date Sampled 10/19/90 Time 1047 hours

Company Contact W.S. Thompson

Telephone (509) 373-3818 1047

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) 699-55-55-125	1, 2-liter, clear glass, soil	analysis of 200-BP-1 Parameters of Interest (see statement of work)	
2) 699-55-55-125A	1, 2-liter, clear glass, soil	analysis of 200-BP-1 Parameters of Interest	
<div>rest</div>			

Field Information\*\* All samples to be analyzed for 200-BP-1 Parameters of Interest. (see statement of work for 200-BP-1 RI/FS).

Special Handling and/or Storage Same day delivery to 325 PNL LAD - Same day delivery. No hazards indicated with field instruments.

## PART II: LABORATORY SECTION

Received by MW

Title Chapman

Date 10/19/90

Analysis Required

Indicate whether sample is soil, sludge, water, etc.

\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-0159

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson/R.Z. Steffler Telephone (509) 373-31818  
Sample Collected by W.S. Thompson/R.Z. Steffler Date 10/19/90 Time 0810, 0645  
Sample Locations 699-52-57 wellsite, North of 200 EAST (200-BP-1)  
Ice Chest No. "Sleepy" polycorlex Field Logbook and Page No. WHL-N-287-2 pg 63  
Remarks All samples to be analyzed for 200-BP-1 Parameters of Interest (see statement of work)  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry, same day to 325 PNL LAB (300 AREA)  
Shipped to 325 PNL LAB  
Possible Sample Hazards NONE INDICATED BY FIELD INSTRUMENTS

Sample Identification

- 1) 699-52-57-128 (90-6712)  
1, 2-liter, clear glass; soil; analysis of 200BP-1 Parameters of Interest
- 2) 699-52-57-125 (90-6117)  
1, 500ml, clear glass; water; anions + tritium  
3, 1-liter, amber glass; water; 2nd HNO<sub>3</sub>; metals + radiochemicals  
3, 1-liter, amber glass; water; 2nd NaOH; CN + Free CN  
200-BP-1 Parameters of Interest

Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>W.S. Thompson</u>	Received by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Date/Time: <u>10/19/90</u> <u>0835 hrs.</u>
Relinquished by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Received by: <u>W.L. [unclear]</u> <u>W.L. [unclear]</u>	Date/Time: <u>10/19/90</u> <u>12:35</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

BOI-020

A-6000-407 (04/90)



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W.S. Thompson / R.Z. Steffler Date Sampled 10/19/90 Time 0810 hours  
Company Contact W.S. Thompson Telephone (509) 373-3818 0645

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) <u>699-52-57-128</u>	<u>1, 2-liter, clear glass; soil;</u>		<u>analysis of Parameters of Interest</u>
2) <u>699-52-57-125</u>	<u>1, 500ml., clear glass; water; Amoxicillin;</u> <u>3, 1-liter, amber glass; water; 2M NaOH; CN+Free CN;</u> <u>3, 1-liter; amber glass; water; 2M HNO<sub>3</sub>; metals+radiochemicals;</u>		<u>200-BP-1</u> <u>Parameters</u> <u>of Interest</u>
<div>NA</div>			

Field Information\*\* All samples to be analyzed for 200-BP-1 Parameters of Interest (see statement of work)

Special Handling and/or Storage Same day delivery to 325 PNL Lab. (Keep chilled)  
No hazards indicated by field instruments.

## PART II: LABORATORY SECTION

Received by MW/lu Title Long Lead Date 10/19/90  
Analysis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.

\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-021

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/22/90 1530  
Received by: Urie  
Customer Sample Number(s): 499-52-57-153, 499-55-55-150  
ALO Sample Number(s): 90-6714 90-6715

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐  
2. Additional Shipping Forms (list):  
RSR  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

- ICE PER (Steffler)  
6. Condition of Sample Vials.

- GOOD  
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

- Agree  
8. Resolution of Problems or Discrepancies.

N/A  
RETURN COMPLETED FORM TO PROJECT MANAGER

B01-022

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson (Envir. Field Services) Telephone (509) 373-3818  
Sample Collected by W.S. Thompson Date 10/22/90 Time 1150  
Sample Locations 699-52-57 wellsite; North of 200 EAST  
Ice Chest No. "Sleepy" polycorder Field Logbook and Page No. WHC-N-287-2 pg.  
Remarks All samples to be analyzed for 200-BP-1 Parameters of Interest (see statement of work). Soil samples support 200-BP-1 RI/FS  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry in ASD sample van to 325 PNL Lab.  
Shipped to 325 PNL Lab (800 AREA)  
Possible Sample Hazards None indicated by field instruments

Sample Identification

1) 699-52-57-153  
1/2-liter, clear glass; soil; 200BP-1; analysis for Parameters of Interest (see statement of work)

Chain of Possession

Relinquished by: <u>Wendy S. Thompson</u>	Received by: <u>R.Z. Skiffler</u>	Date/Time: <u>10/22/90 1230 hrs.</u>
Relinquished by: <u>R.Z. Skiffler</u>	Received by: <u>M.W. Van</u>	Date/Time: <u>10/22/90 13:30</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-023

A-6000-407 (04/90)



## PART I: FIELD SECTION

Date Sampled 10/22/90 Time 1150 hours

Telephone 1509 1373-3818

[illegible]

Field Information\*\* All samples to be analyzed for 200-BP-1 Parameters of Interest (see statement of work)

Special Handling and/or Storage Same day delivery to 325 PNL LAB for  
analysis. Keep on wet ice until lab receipt. No hazards  
indicated with field instruments

## PART II: LABORATORY SECTION

Received by

**Title**

Date \_\_\_\_\_

### Analysis Required

Indicate whether sample is soil, sludge, water, etc.

\*Use back of page for additional information relative to sample location.

**A-6000-406 (07/89)**

BOA-024



Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: W.S. Thompson (Envir Field Services) Telephone (509) 373-3811  
Sample Collected by: W.S. Thompson Date 10/22/90 Time 1335  
Sample Locations: 699-55-55 well site; North of 200 EAST  
Ice Chest No.: "Sleepy" polycor Field Logbook and Page No. LVHC-N-287-2 pg 71, 72  
Remarks: All samples to be analyzed for 200-BP-1 Parameters of Interest  
supporting RI/FS. (See statement of work)  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment: Hand carry in AIL Sample van (same day delivery)  
Shipped to: 325 PNL Lab (360 Area)  
Possible Sample Hazards: None indicated with field instruments.

Sample Identification

1) 699-55-55-150

1, 2-liter; clear glass; 500 ml; analysis of 200-BP-1 Parameters of Interest  
(see Statement of Work)

90-6715

Chain of Possession

Relinquished by: W.S. Thompson

Received by: R. Z. Still

Date/Time:

10/22/90 1405 hrs

Relinquished by: R. Z. Still

Received by: W.W. [unclear]

Date/Time:

10/22/90 1530

Relinquished by:

Received by:

Date/Time:

Relinquished by:

Received by:

Date/Time:

B01-025

A-6000-407 (04/90)



Westinghouse  
Hanford Company

## SAMPLE ANALYSIS REQUEST

### PART I: FIELD SECTION

Collector W.S. Thompson / R.Z. Steffler

Date Sampled 10/22/90 Time 1335 hours

Company Contact Wendy S. Thompson

Telephone (509) 373-3818

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
649-55-55	150 <sup>ml</sup> 2-liter	Clear glass	anal. analysis of 200BP-1 Parameters of Interest (see statement of work)

Field Information\*\* All samples to be analyzed for 200BP-1 Parameters of Interest (see statement of work) for 200BP-1 RI/FS.

Special Handling and/or Storage Keep samples chilled on wet ice until delivery to 225 PNL lab for analysis. No hazards indicated with field instruments.

### PART II: LABORATORY SECTION

Received by

MW

Title

Group Leader

Date

10/22/90

Analysis Required

Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-026

Attachment 6

Pacific Northwest Laboratory, 200-BP-1, Parameters of Interest

Data Package 3

200-BP-1

200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 3; Rev 0

PARAMETERS OF INTEREST - soil  
sample value/qualifier

Parameter	DL	E33-38-006.2	E33-40-008
=====			
ANIONS (ppm)			
-----			
nitrite	0.2	<0.2	<0.2
nitrate	0.2	0.6	0.9
phosphate	0.6	<0.6	<0.6
sulfate	3.7	6.3	15.0
CN (ppm)			
-----			
total	0.1-0.4	<0.1	<0.1 UJ
free	N/A	NR	NR
GFAA (ppb)			
-----			
Se	1.3	<1.3 UJ	<1.3 UJ
Bi	4.3	<4.3 UJ	<4.3 UJ

NR not reported and/or requested

all sample numbers begin with 299- prefix

200-BP-1 DATA QUALIFIER DEFINITIONS

---

- U      The material was analyzed for, but was not detected above the level of the associated value. The associated value may be the Sample Quantitation Limit (SQL) or the Detection Limit (DL).
- J      The associated value is an estimated quantity.
- UJ     The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- R      The data are unusable.

211130173



Westinghouse  
Hanford Company

# OSH RCRA LEVEL C DATA ASSESSMENT

DATE 01/12/91

REVIEWED BY JA Lerch

LABORATORY PNL-325

CASE # TPP-16772

SDG # Report 3; Rev 0

parameters of  
interest

SAMPLES/MATRIX E33-40-008

all sample #'s  
begin with E33-38-006.2

a 299-  
prefix -both soil

## DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	<u>Anions</u>	<u>CN(total)</u>	<u>GFAA</u>
1. <u>Holding times</u>	<u>0</u>	<u>X</u>	<u>0</u>	
2. <u>Matrix Spike</u>	<u>0</u>	<u>0</u>	<u>M</u>	
3. <u>Duplicate Analysis</u>	<u>0</u>	<u>0</u>	<u>0</u>	
4. <u>Method Blanks</u>	<u>0</u>	<u>0</u>	<u>0</u>	
5. <u>Calibrations/Control Std.</u>	<u>0</u>	<u>0</u>	<u>0</u>	
6. <u>Other QC - see attach</u>	<u>0</u>	<u>0</u>	<u>0</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	

0 = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: Se, Bi spike recoveries very low;  
all results acceptable w/qualification

NOTES: none

o Refer to the corresponding attachments for explanation of any problems.

RCRA LEVEL C QC

Name JA Lerch

Date 01/12/91

QC Check: Holding times

COMMENTS: Anions - all holding time requirements met  
CN - holding time exceeded by 4 days on 299-E33-40-008  
GFAA - all holding time requirements met

ACTION: qualify associated results as per  
OSM guidelines

sample # constituent value/qual

sample # constituent value/qual

299-E33-40-008 CN <0.1 UJ

RCRA LEVEL C QC

Name JA Lerch Date 1/12/91

QC Check: Matrix Spike

COMMENTS: Anions - all recoveries within acceptable range (78 to 98 % range)

CN - all Recoveries between 97 and 101 %; no problems

GFAA - Se, Bi spike recoveries very low; Se analytical spike recoveries low

ACTION: qualify associated results as per OSM guidelines

sample #	constituent	value/qual
299-E33-40-008	Se	<IDL UJ
	Bi	<IDL UJ
299-E33-38-006.2	Se	<IDL UJ
	Bi	<IDL UJ

sample #	constituent	value/qual
GFAA		
-low spike recoveries appear to be result of interference and lack of Zeeman background correction		



RCRA LEVEL C QC

Name JA Lerch Date 01/12/91

QC Check: Duplicate Analysis

COMMENTS: anions - all RPD's less than 11.37. where  
applicable; no problems

CN - both sample + dup below detection limits; RPD N/A

GFAA - all duplicate RPD's OK.

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch *JS* Date 01/12/91

QC Check: Blank analysis

COMMENTS: Anions - no contaminants detected in blanks  
CN - no contaminants detected in CN blanks  
GFAA - no contaminants detected in Se, Bi blanks

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

RCRA LEVEL C QC

Name JA Lerch Date 01/12/91

QC Check: Calibrations / Control Std

COMMENTS: Anions - all std  $\%R$  between 93-109%; no problems

CN - all LCS recoveries acceptable

GFAA - all calibration, control std  $\%R$  ok

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

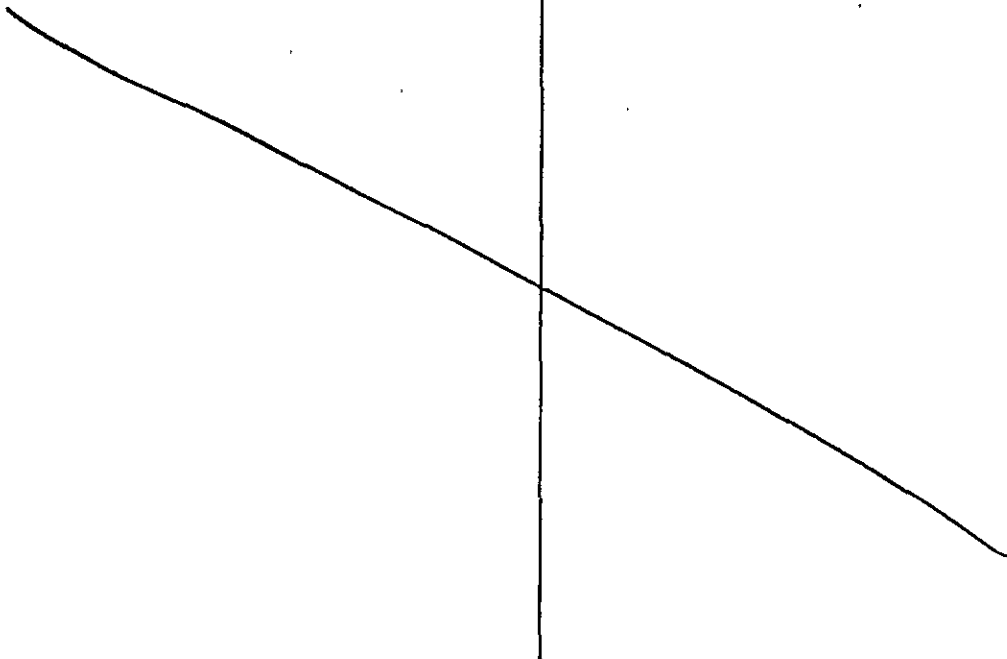
Name JA Lerch Date 01/12/91

QC Check: Other QC

COMMENTS: all results were below 2ppm →  
no Free CN analysis Required

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analyses for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, and tritium. Weight percent solid was also determined for soil samples. All data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 14) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie

B. M. Gillespie  
200-BP-1 Project Manager

1-7-90

Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPJP ALO-001.

J. L. Daniel

J. L. Daniel  
PNL ACL Quality Representative

1/8/91

Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
299-E33-40-008	90-7060	Soil
299-E33-38-006.2	90-7061	Soil

## INORGANIC DATA TABLES



TABLE 2:  
WEIGHT PERCENT SOLIDS SUMMARY SHEET

SAMPLE ID#	PNL LOG#	SAMPLE WT %	DUPLICATE WT %	AVERAGE SOLIDS WT %
299-E33-40-008	90-7060	93.86	93.52	93.69
299-E33-38-006.2	90-7061	96.96	96.74	96.85

\* Weight Percent Solids were determined following the method outlined in PNL-ALO-504.

### ANION ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. The sample solution was then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis was performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte. Data results are reported as dry weight (i.e. converted from weight % solids).

The mean % spike recoveries (sample + spike, matrix duplicate spike and blank + spike) and their standard deviation (SD) for this set of data are as follows:

	<u>REC ± SD (%)</u>	
NO2-N	96.3	1.9
NO3-N	94.1	3.1
PO4-P	83.6	3.6
SO4	84.1	11.2

Upon review of the nitrate and sulfate soil analysis of duplicates the Relative Percent Differences (RPD) of the duplicate values are:

	<u>RPD</u>
NO3-N	10.9
SO4	11.3

The values varied due to heterogeneity of sample matrix. The concentration of the other soil analytes was below the detection limits, therefore a RPD is not calculated.

The requested hold time maximum for water analysis of anions is 48 hours from sampling to the time of analysis. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

TABLE 3: ANION IC ANALYSIS DATA

NITRITE (NO<sub>2</sub>-N)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	DUP+SPIKE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-38-006.2	90-7060	<0.2	<0.2	NA								
299-E33-40-008	90-7061	<0.2	<0.2	NA	<0.2	21.3	21.7	20.6	21.8	98.2	94.5	96.1

Detection limit = 0.2 mg/Kg

Note: RPD (relative percent difference) only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 102.2% and 98.3%, respectively.

TABLE 3: ANION IC ANALYSIS DATA

NITRATE (NO<sub>3</sub>-N)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	DUP+SPIKE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-38-006.2	90-7060	0.6	<0.2	NA								
299-E33-40-008	90-7061	0.9	1.0	10.9	<0.2	16.0	16.1	15.7	16.2	93.7	91.2	97.3

Detection limit = 0.2 mg/Kg

Note: RPD only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 96.3% and 93.7%, respectively.

TABLE 3: ANION IC ANALYSIS DATA

PHOSPHATE (PO<sub>4</sub>-P)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (ug)	SPIKE+SAMPLE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	DUP+SPIKE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-38-006.2	90-7060	<0.6	<0.6	NA								
299-E33-40-008	90-7061	<0.6	<0.6	NA	<0.6	18.8	23.3	19.2	23.3	80.7	82.4	87.7

Detection limit = 0.6 mg/Kg

Note: RPD only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 92.0% and 94.3%, respectively.

10

TABLE 3: ANION IC ANALYSIS DATA

SULFATE (SO<sub>4</sub>)

SOLID SAMPLES

		C1	C2		C5	C3		C6		% RECOVERIES		
SAMPLE ID#	PNL LOG#	SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)	RPD	BLANK (ug)	SPIKE+SAMPLE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	DUP+SPIKE ANALYSIS (mg/Kg)	SPIKE ACTUAL (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-38-006.2	90-7060	6.3	<3.7	NA								
299-E33-40-008	90-7061	15.0	16.8	11.3	<3.7	71.7	71.3	70.9	71.5	78.3	76.9	97.0

Detection Limit = 3.7 mg/Kg

Note: RPD only calculated when both sample and duplicate results are >DL.

Comments: If all spike recovery calculations are normalized relative to C4=100%, then % spike recoveries for C3 and C6 are 80.7% and 79.3%, respectively.

## CYANIDE ANALYSIS RESULTS

The samples and their accompanying QC samples were prepared by procedure PNL-ALO-270, Total Cyanide in Waters, Solids or Sludges. The methodology is comparable to CLP SOW 788 Method 335.2 distillation and colorimetric technique for the analysis of cyanide. The analysis was performed in building 3720 in the 300 area.

The procedure, PNL-ALO-270, did not reflect the correct CLP standard preparation guidelines (section 7.3.2.1 and 7.4.2.1). The analysts made a deviation to the procedure and used the client requested method, CLP SOW (788), method 335.2, for the standard preparation (page D-76). An Interim Change Notice (ICN) to the procedure is in the process of being written.

The sample results were below the client required detection limits of 10 mg/Kg. Sample results are all below 2 ppm; therefore free cyanide analysis was not required.

Upon review of the sample spiked data results, the mean recovery is 97.0% with a standard deviation of 0.4%. The mean recovery of the Laboratory Control Standard is 90.5% with a standard deviation of 2.3%.

The general Environmental Protection Agency (EPA) hold time for total cyanide is 12 days. The hold time was inadvertently not met for one of the samples but was met for the other. There is no known impact on the results of the late analysis date as the cyanide concentrations are below the detection limits, and samples are preserved in basic media. The LCS standards were acquired from EPA in April of 1990 (six months prior to analysis) and are in basic media and produce satisfactory recoveries (mean of 97%); therefore the late analyses of the sample is unlikely to have any impact on the results.

TABLE 4: TOTAL CYANIDE ANALYSIS DATA

## SOLID SAMPLES

SAMPLE ID#	PHL LOG#	% RECOVERIES		RPD	G5 BLANK (ug)	G3		G6		C3		
		G1 SAMPLE (mg/Kg)	G2 SAMPLE DUP (mg/Kg)			SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP SPIKE (mg/Kg)	SPIKE (mg/Kg)	SAMPLE + SPIKE	BLANK+ SPIKE	LCS SAMPLE
299-E33-40-008	90-7060 (a)	<0.1	0.1	NA	0.1	9.66	9.62	9.66	9.61	100.5	92.8	94.4
299-E33-38-006.2	90-7061	<0.1	<0.1	NA	<0.1	9.69	9.96			97.2		92.1

Detection limits for soil = 0.1-0.4 mg/Kg (theoretical)

(a) Hold time missed by 6 days.

*JF*  
01/12/91

FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 ppm, therefore free cyanide analysis was not performed on the samples in this set.



Table 5: Free Cyanide Analysis Data

No data necessary.

## GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestates were then analyzed by graphite furnace atomic absorption (GFAAS) following procedure PNL-ALO-215, Selenium (Atomic Absorption, Furnace Method), for selenium and PNL-ALO-216, Bismuth (Atomic Absorption, Furnace Technique), for bismuth. Se and Bi analysis methodologies are consistent with CLP SOW 788 Method 270.2. Digestion of samples and analysis by GFAAS was conducted in building 325.

Analysis for Se and Bi was conducted on a Perkin-Elmer 5100/HGA 600 (not equipped with a Zeeman background correction device). The quarterly instrument detection limit (IDL) for Se was found to be 1.3  $\mu\text{g/L}$ . The corresponding IDL for Bi was found to be 4.3  $\mu\text{g/L}$ .

A preliminary analysis of the samples was performed to determine the dilution factor necessary to bring the concentration to mid-range in the calibration curve. All sample solutions were determined to have Se and Bi levels below the respective detection limits 3.25  $\mu\text{g/L}$  and 10.75  $\mu\text{g/L}$ . Detection limit was defined as 2.5 times the IDL.

The data are reported in Table 6 for selenium results and Table 7 for bismuth results. Each table has a summary results table followed by a batch results table for easy verification of control standards and quality control samples analyzed per batch.

Upon review of the data tables for selenium (Table 6A) and bismuth (Table 7A), the average recovery of selenium spike is 79.6% with a standard deviation of 33.5% (for samples with recoveries above 0%), the average recovery of bismuth spike is 89.9% with a standard deviation of 9.3% (for samples with recoveries above 5%). A precision determined from the duplicate sample analysis is not possible since the results are below detection limits.

The large bias and poor precision associated with the analysis of selenium in soil samples is attributed to the low concentrations of selenium and spike standard in the samples and matrix interference (of iron) in the

determination in selenium analysis. A Zeeman background correction attachment is necessary for this matrix correction. The data in Tables 6 and 7 are flagged with appropriate CLP (as defined in CLP SOW 7/88, pages B-19 and 20) flags where necessary. ICB, CCB, ICV, CRA, etc. are as defined in the CLP SOW 7/88, section E.

The CLP SOW 788 specified hold time of 180 days was met as well as the contract required hold time of 120 days.

TABLE 6: SELENIUM ANALYSIS DATA  
ACID EXTRACTABLE SELENIUM IN SAMPLES

SOLID SAMPLES

		B1		B2		B5		B3		B6		% RECOVERIES		
SAMPLE ID#	PNL LOG# (a)	SAMPLE (ug/L)	Spike % Rec	SAMPLE DUP (ug/L)	Spike % Rec	RPD (c)	BLANK (ug/L)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L) (b)	BLANK+SPIKE (ug/L)	SPIKE (ug/L) (b)	B3 SAMPLE + SPIKE	B6 BLANK+ SPIKE	B4 LCS SAMPLE
699-55-55-050	90-5356	<1.3		<1.3			<1.3	<1.3	25.00	<1.3	25	0	0	106
699-55-55-050	90-5356-AS	4.8	119	4.4	116	8.7	11.0	6.8	10	7.3	10	122	123	
299-E33-40-008	90-7060	<1.3	UJ											
299-E33-40-008	90-7060	3.5	67											
299-E33-38-006.2	90-7061	<1.3	UJ											
299-E33-38-006.2	90-7061	3.2	75											

Instrument Detection Limit (IDL) for soil in solution = 1.3 ug/L = 0.1 mg/Kg (calculated using average sample size of 1.5 g)

Method Detection Limit (DL) for soils in solution = IDL x 2.5 = 3.25 ug/L = 0.22 mg/Kg (calculated using average sample size of 1.5 g)

Contract Required Detection Limit (CRDL) = 0.5 ug/g (0.5 mg/Kg)

(a) Analytical Spike (AS) = 10 ug/L

(b) Pre-digest spike = 25 ug/l for B3, B4 and B6

(c) RPD only calculated if both sample and duplicate are greater than detection limit.

*JL*  
1/12/91

TABLE 7: BISMUTH ANALYSIS DATA  
ACID EXTRACTABLE BISMUTH IN SAMPLES

SOLID SAMPLES

SAMPLE ID#	PNL LOG# (a)	B1		B2		RPD (c)	B5 BLANK (ug/L)	B3		B6		% RECOVERIES		
		SAMPLE (ug/L)	Spike % Rec	SAMPLE DUP (ug/L)	Spike % Rec			SPIKE+SAMPLE (ug/L)	SPIKE (ug/L) (b)	BLANK+SPIKE (ug/L)	SPIKE (ug/L) (b)	B3 SAMPLE + SPIKE	B6 BLANK+ SPIKE	B4 LCS (d) SAMPLE
699-55-55-DSO	90-5356	<4.3		<4.3			<4.3	<4.3	50	<4.3	50	4	4	89
699-55-55-DSO	90-5356-AS	18	87	13.5	65	28.6		21.2	20	16.9	20	96	74	
299-E33-40-008	90-7060	<4.3	WT											
299-E33-40-008	90-7060	17.4	86											
299-E33-38-006.2	90-7061	<4.3	WT											
299-E33-38-006.2	90-7061	17.2	87											

Instrument Detection Limit (IDL) for soil in solution = 4.3 ug/L = 0.3 mg/Kg (calculated using average sample size of 1.5 g)

Method Detection Limit (DL) for soils in solution = IDL x 2.5 = 10.75 ug/L = 0.72 mg/Kg (calculated using average sample size of 1.5 g)

Contract Required Detection Limit (CRDL) = 10 ug/g (10 mg/Kg)

(a) Analytical Spike (AS) = 20 ug/L

(b) Pre-digest spike = 50 ug/l

(c) RPD only calculated if both sample and duplicate are greater than detection limit.

(d) B4 = LCS-0287 + 40 ug Bi spike

*JS*  
1/12/91

**200-BP-1**  
**GROUNDWATER ANALYSIS PROJECT**

**PARAMETERS OF INTEREST**  
**DATA PACKAGE/REPORT No. 3**

**Revision 0**

**APPENDIX B**  
**CHAIN OF CUSTODY**

200-BP-1  
GROUNDWATER ANALYSIS PROJECT

PARAMETERS OF INTEREST  
DATA PACKAGE/REPORT No. 3

Appendix B  
TABLE OF CONTENTS

Appendix B - Chain of Custody

- B1 - Westinghouse Chain of Custody and Sample Analysis Request Forms
- B2 - PNL Chain of Custody Forms

B00-001

**B1 - WESTINGHOUSE CHAIN OF CUSTODY,  
SAMPLE ANALYSIS REQUEST FORMS  
AND PNL SAMPLE RECEIPT FORMS**

**B01-001**



SAMPLE RECEIPT FORM

Delivered by: Stephan Date/Time: 11/12/90 19:47  
Received by: Eric  
Customer Sample Number(s): 299-E33-40-008  
ALO Sample Number(s): 90-7060

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_  
2. Additional Shipping Forms (list):  
RSR  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent \_\_\_\_\_

If Present, Condition: \_\_\_\_\_

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

ICE ID

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-002

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: W.S. THOMPSON Telephone: 373-3818  
Sample Collected by: W.S. THOMPSON/R.Z. STEPHEN Date: 11/12/90 Time: 1315  
Sample Locations: 299-E33-40 WELSITE  
Ice Chest No.: Epsilon #4 Field Logbook and Page No.: WHC-N-287-2 pg 88-89  
Remarks: SAMPLE TO BE ANALYZED FOR 200-BP1 PARAMETERS OF INTEREST  
(SEE STATEMENT OF WORK)  
Bill of Lading No.: N/A Offsite Property No.: N/A  
Method of Shipment: HAND CARRY IN ASL SAMPLE VAN  
Shipped to: 325 PNL LAB (300 AREA)  
Possible Sample Hazards: None indicated by field instrument.

Sample Identification

299-E33-40-008

1.2-liter, clear glass, soil; Parameter of Interest (200BP-1)

Chain of Possession

Relinquished by: <u>W.S. THOMPSON</u> <u>W.S. Thompson</u>	Received by: <u>R.Z. STEPHEN</u> <u>R.Z. Stephen</u>	Date/Time: <u>11/12/90</u> <u>1351</u>
Relinquished by: <u>R.Z. STEPHEN</u> <u>R.Z. Stephen</u>	Received by: <u>M.W. STEPHEN</u> <u>M.W. Stephen</u>	Date/Time: <u>11/12/90</u> <u>1447</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by: <u>B01-003</u>	Date/Time:



## PART I: FIELD SECTION

[illegible]

Special Handling and/or Storage No hazards indicated by field instruments  
Keep chilled on ice until receipt at lab.

**PART II: LABORATORY SECTION**

Received by M. N. Olin Title Group Leader Date 11/12/90  
 sis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.

\*Use back of page for additional information relative to sample location.

**A-6000-406 (0789)**

B01-004

SAMPLE RECEIPT FORM

Delivered by: R. STEFFLER Date/Time: 11/16/90

Received by: J. ROBBINS / S. BARSANO

Customer Sample Number(s): 299-E33-38-006.2

ALO Sample Number(s): 90-7061

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

COC

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: OK

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

OK

AT REFRIG TEMP

6. Condition of Sample Vials.

OK

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

OK

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-005

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: S. E. KOS Telephone: 373-3381  
Sample Collected by: R. STEFFLER/S. KOS Date: 11/16/90 Time: 1103  
Sample Locations: 299-E33-38 WELLSITE  $\approx$  150' SOUTH OF 214 BY CRIBS  
Ice Chest No.: EPSILON #3 Field Logbook and Page No.:  
Remarks: SAMPLE TO BE ANALYZED FOR 200-BP-1 PARAMETERS OF  
INTEREST (SEE STATEMENT OF WORK) FOR E1/FS  
Bill of Lading No.: NA Offsite Property No.: NA  
Method of Shipment: HAND CARRY TO 325 PNL LAB IN ASL SAMPLE VAN  
Shipped to: 325 PNL LAB (300 AREA)  
Possible Sample Hazards: NONE INDICATED WITH FIELD INSTRUMENTS

Sample Identification

1) 299-E33-38-006.2  
2) LITER, CLEAR GLASS, SOIL; ANALYSIS OF 200-BP-1 PARAMETERS OF  
INTEREST

Chain of Possession

Relinquished by: <u>S. E. KOS</u> <u>S. E. Kos</u>	Received by: <u>R. Steffler</u> <u>R. Steffler</u>	Date/Time: <u>11/16/90 1200</u>
Relinquished by: <u>R. Steffler</u> <u>R. Steffler</u>	Received by: <u>James Robinson</u> <u>James Robinson</u>	Date/Time: <u>11/16/90 1:36 PM</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by: <u>B01-006</u>	Date/Time:



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector R. STEFFLER / S. KOS

Date Sampled 11/16/90 Time 1103 hours

Company Contact S. KOS

Telephone (509) 373-3381

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) 299-E33-38-006.2	1, 2 LITER, CLEAR GLASS, SOIL		ANALYSIS OF 200-BP-1 PARAMETERS OF INTEREST
N A			

Field Information\*\* SAMPLES TO BE ANALYZED FOR 200-BP-1  
PARAMETERS OF INTEREST (SEE STATEMENT  
OF WORK)

Special Handling and/or Storage NO HAZARDOUS INDICATION WITH  
FIELD INSTRUMENTS

## PART II: LABORATORY SECTION

Received by

James Robinson

Title

Senior Research Scientist

Date

11/16/90

Analysis Required

Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-007

[illegible]

70-1068

MAY 96

RECEIVED

6

70-1068

MAY 96

RECEIVED

6



Westinghouse  
Hanford Company

# OSM RCRA LEVEL C DATA ASSESSMENT

DATE 02/24/91 SAMPLES/MATRIX E33-40-201.7 Soil  
 REVIEWED BY JA Lerch all sample #'s E33-40-201.7A Soil  
 LABORATORY PNL-525 begin w/ E33-40-200 Water  
 CASE # TPP 16772 E33-40-201 Water  
 SDG # Report 4; Rev 0 E33-40-201A Water  
Parameters of Interest

## DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	Anions	CN (total)	GFAA Metals
1. <u>Holding time</u>	<u>0</u>	<u>0</u>	<u>X</u>	<u>0</u>
2. <u>Matrix Spike</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>M</u>
3. <u>Duplicate Analysis</u>	<u>X</u>	<u>0</u>	<u>0</u>	<u>0</u>
4. <u>Blanks</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
5. <u>Calibration/Control Std.</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
6. <u>Other QC</u> <u>see attachment</u>				
7. <u></u>				
8. <u></u>				
9. <u></u>				
10. <u></u>				

0 = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: See results for soil unusable due to  
low spike recoveries; all other results acceptable  
with qualifiers

NOTES: none

o Refer to the corresponding attachments for explanation of any problems.



RCRA LEVEL C QC

Name JA Lerch *fl* Date 02/25/91

QC Check: Holding Time

COMMENTS: Anions - all holding time requirements met  
Total CN - holding time for sample 299-E33-40-201.7 exceeded,  
all other holding time criteria met  
GFAA metals - all holding time criteria met  
ACTION: qualify associated results as per  
OSM guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
299-E33-40-201.7	CN	<1.0 UJ			

RCRA LEVEL C QC

Name JA Lerch *fl* Date 02/25/01

QC Check: Matrix Spike

COMMENTS: Anions - all spike recoveries within acceptable limits

CN - all CN spike recoveries acceptable

GFAA metals - Se spike 70R for soils 0 (attributed to interference)

all other Se soil + water 20R + AS 70R within control

~~Bi~~ Bi - spike 70R for soils low, AS 20R low; all Bi  
spike 20R results for water ok

Action: qualify associated results as per ASM guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
all soil	Bi	<1 LJ			
all soil	Se	<5 R			

RCRA LEVEL C QC

Name JA Lerch Date 2/25/91

QC Check: Duplicate Analysis

COMMENTS: Anions - sulfate duplicate<sup>RPD</sup> for 299-E33-40-201.7A high  
all other RPD's ok where applicable

CN - all results < detection limit RPD's N/A

CGAA - all results < detection limit RPD's N/A

ACTION: qualify associated results as per OSM  
guidelines

sample # constituent value/qual

sample # constituent value/qual

19-E33-40-201.7A Sulfate 76.3 J

RCRA LEVEL C QC

Name JA Verch ff Date 02/25/91

QC Check: Blanks

COMMENTS: all anion, CN, and GFAA blanks free  
of contamination

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch /s/ Date 02/25/95

QC Check: Calibration/Control Samples

COMMENTS: Anions - all std recoveries ok

CN - all LCS recoveries ok; calibration curves ok

GFAA - all initial + continuing cal. std recoveries ok, LCS recoveries  
ok; Run Log sequences ok

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch ~~pt~~ Date 02/25/91

QC Check: other QC

COMMENTS: all CN results < DL - no free CN or  
ferrocN required

ACTION: —

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

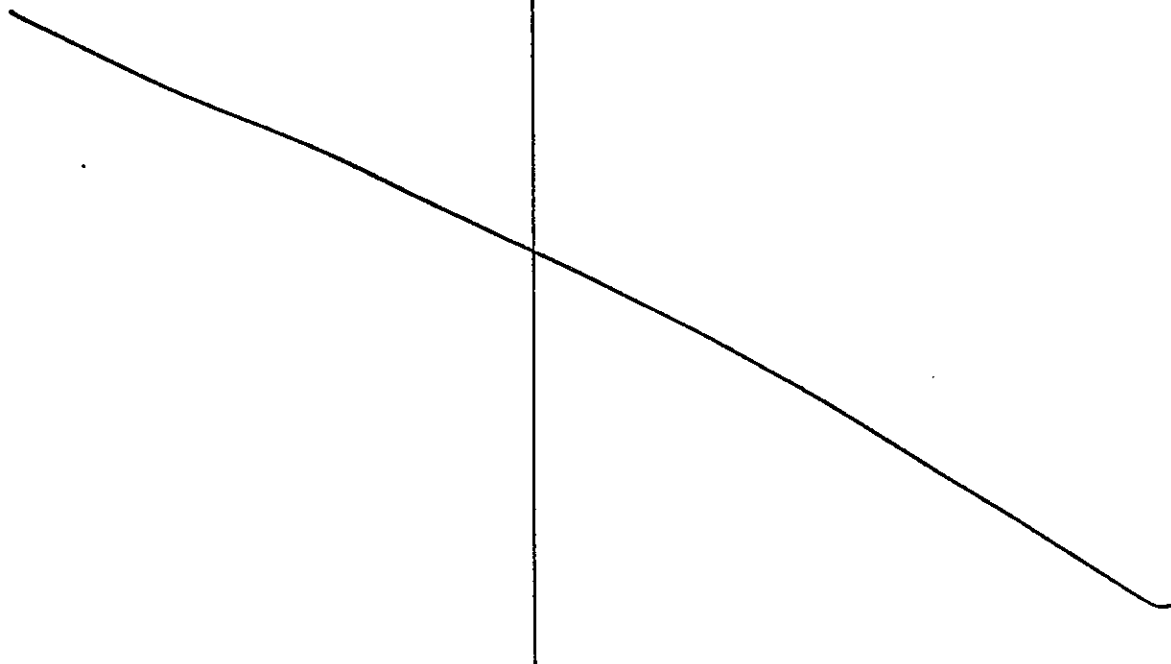


TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
299-E33-40-201.7	90-7062	Soil
299-E33-40-201.7A	90-7063	Soil
299-E33-40-200	90-7064	Water
299-E33-40-201	90-7065	Water
299-E33-40-201A	90-7066	Water

## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples were the parameters of interest in the WHC SOW. These parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, selenium, bismuth, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, and tritium. Weight percent solid was also determined for soil samples. All data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and matrix spike duplicates were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 15) for each analyte or method. Four appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data and one that contains the primary radiochemistry analytical data.



CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPJP ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie

B. M. Gillespie  
200-BP-1 Project Manager

2-6-91

Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPJP ALO-001.

J. L. Daniel

J. L. Daniel  
PNL ACL Quality Representative

2/7/91

Date

### ANION ANALYSIS RESULTS

The soil samples and their accompanying QC samples are prepared by procedure PNL-ALO-108, Aqueous Leach of Sludges, Soils, and Other Solid Samples for Anion Analysis. These soil leach solutions and water samples are then analyzed by Ion Chromatography (IC) according to procedure PNL-ALO-212, Determination of Inorganic Anions by Ion Chromatography. This method is comparable to EPA method 300.0. The total analysis is performed in building 325 in the 300 area.

The data are listed in Table 3. Analyses are listed on four separate tables, a table for each analyte. The data are reported this way to allow review of sample data, duplicates, blanks, matrix spikes, RPD and % recoveries for samples of each analyte. Soil data results are reported on a dry weight basis (i.e, corrected for weight % solids).

The mean % spike recoveries (sample + spike, matrix duplicate spike and blank + spike) and their standard deviation (SD) for this set of data (including both soil and water samples) are as follows:

	<u>REC</u>	<u>± SD</u>	<u>(%)</u>
N02-N	104.1	4.0	
N03-N	99.1	2.8	
P04-P	88.2	6.7	
S04	99.9	2.1	

Upon review of the NO3-N and SO4 soil and water analysis, the mean RPDs of the duplicate values (those above the detection limit) are:

	<u>RPD</u>
NO3-N	3.2
SO4	20.7

The values varied due to heterogeneity of soil samples and the variations between sample matrices. The concentration of the other analytes was below the detection limits, therefore a relative percent difference is not calculated.

The hold times for water analysis of anions is 48 hours from sampling to the time of analysis. There are no hold times associated with the analysis of soils except that the analysis of anions be performed within 48 hours of the aqueous leach of the soils. All leaches of soils were analyzed within the requested hold time.

TABLE 3: ANION IC ANALYSIS DATA

NITRITE (NO<sub>2</sub>-N)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (mg/kg)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-201.7	90-7062	<2.0	<2.0	N/A	<2.0	198.0	200.0	209.0	212.0	99.0	98.6	100.0
299-E33-40-201.7a	90-7063	<2.0	<2.0	N/A		236.0	228.0			103.5		
										mean	100.4	(C3 and C6)
										std. dev.	2.7	

DL = Detection limit of 2.0 mg/Kg

CD assumes average C1-C2 sample weight for mg/kg equivalent

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug/L)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-200	90-7064	<14.9	<14.9	N/A	<14.9	1650	1520	1620	1520	108.6	106.6	107.9
299-E33-40-201	90-7065	<14.9	<14.9	N/A		1620	1520			106.6		
299-E33-40-201a	90-7066	<14.9	<14.9	N/A		1670	1520			106.6		
										mean	107.1	(C3 and C6)
										std. dev.	1.0	

DL = Detection Limit of 14.9 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

TABLE 3: ANION IC ANALYSIS DATA

## NITRATE (NO3-N)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (mg/kg)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-201.7	90-7062	8.2	8.4	2.7	<2.0	150.0	148.0	161.0	158.0	95.6	96.5	98.2
299-E33-40-201.7a	90-7063	7.8	8.4	6.8	<2.0	169.0	169.0			95.2		
										mean	95.8	(C3 and C6)
										std. dev.	0.7	

DL = Detection limit of 2.0 mg/Kg

C5 assumes average C1-C2 sample weight for mg/kg equivalent

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug/L)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-200	90-7064	27.1	27.1	0.0	<14.9	1150	1130	1160	1130	99.4	100.3	101.8
299-E33-40-201	90-7065	<14.9	<14.9	N/A		1160	1130			102.7		
299-E33-40-201a	90-7066	<14.9	<14.9	N/A		1150	1130			101.8		
										mean	101.1	(C3 and C6)
										std. dev.	1.5	

DL = Detection Limit of 14.9 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

TABLE 3: ANION IC ANALYSIS DATA

## PHOSPHATE (PO4-P)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (mg/kg)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-201.7	90-7062	<6.0	<6.0	N/A	<6.0	170.0	214.0	187.0	227.0	79.4	82.4	85.9
299-E33-40-201.7a	90-7063	<6.0	<6.0	N/A		193.0	244.0			79.1		
										mean	80.3	(C3 and C6)
										std. dev.	1.8	

DL = Detection limit of 6.0 mg/Kg

C5 assumes average C1-C2 sample weight for mg/kg equivalent

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug/L)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-200	90-7064	<60	<60	N/A	<60	1500	1630	1600	1630	92.0	98.2	92.6
299-E33-40-201	90-7065	<60	<60	N/A		1510	1630			92.6		
299-E33-40-201a	90-7066	<60	<60	N/A		1490	1630			91.4		
										mean	93.6	(C3 and C6)
										std. dev.	3.1	

DL = Detection Limit of 60.0 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

TABLE 3: ANION IC ANALYSIS DATA

SULFATE (SO<sub>4</sub>)

## SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (mg/Kg)	SAMPLE DUP (mg/Kg)		BLANK (mg/kg)	SPIKE+SAMPLE (mg/Kg)	SPIKE (mg/Kg)	DUP+SPIKE (mg/Kg)	SPIKE (mg/Kg)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-201.7	90-7062	98.4	89.4	9.6	<34	707.0	657.0	764.0	697.0	93.3	96.1	101.4
299-E33-40-201.7a	90-7063	76.3	105	31.7		820.0	749.0			97.4		
										mean	95.6	(C3 and C6)
										std. dev.	2.1	

DL = Detection limit of 34 mg/Kg

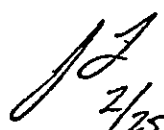
C5 assumes average C1-C2 sample weight for mg/kg equivalent

## WATER SAMPLES

SAMPLE ID#	PNL LOG#	C1	C2	RPD	C5	C3		C6		% RECOVERIES		
		SAMPLE (ug/L)	SAMPLE DUP (ug/L)		BLANK (ug/L)	SPIKE+SAMPLE (ug/L)	SPIKE (ug/L)	DUP+SPIKE (ug/L)	SPIKE (ug/L)	C3 SAMPLE + SPIKE	C6 DUP+ SPIKE	C4 BLANK+ SPIKE
299-E33-40-200	90-7064	<250	<250	N/A	<250	5070	5000	5080	5000	101.4	101.6	102.2
299-E33-40-201	90-7065	<250	<250	N/A		4970	5000			99.4		
299-E33-40-201a	90-7066	<250	<250	N/A		5030	5000			100.6		
										mean	100.8	(C3 and C6)
										std. dev.	1.0	

DL = Detection Limit of 250 ug/L

Note: RPD only calculated when both sample and duplicate results are &gt;DL.

  
 2/25/91

### CYANIDE ANALYSIS RESULTS

Samples and their QC samples were analyzed by procedure PNL-ALO-270 "Total Cyanide in Waters, Solids or Sludges". The procedure, PNL-ALO-270 has been rewritten to reflect the correct CLP standard preparation guidelines used in Parameters of Interest Data/Reports No. 1 - No. 3. Methodology is comparable to CLP SOW 788, Method 335.2, distillation and colorimetric technique for the analysis of cyanide. Analysis was performed in building 3720 in the Hanford Site 300 area.

The sample results were below the CRDL of 10 µg/L in water and 1 mg/Kg for solids. Free cyanide analysis was not required as all samples had concentrations of cyanide of less than 2 mg/Kg. In all cases the 12 day hold time specified for cyanide analysis under the CLP protocol was met.

Average spiked sample cyanide recovery was 98.4% with a standard deviation of 4.9%. Recovery of cyanide for laboratory control samples was 104.2% for soil standard LCS-0689 and 106.5% for liquid standard ICV-6.

Cumulative QA data on laboratory control samples for data packages 1-4 are summarized in Table 1 in appendix C, page C05-002. All laboratory control sample values were well within the 25% accuracy limits, with LCS-0689 and ICV-6 average recoveries of 98.0 and 103.3%, respectively.



TABLE 4: TOTAL CYANIDE ANALYSIS DATA

## SOLID SAMPLES

Sample ID#	PNL Log#	G1 Sample (mg/Kg)	G2 Sample dup. (mg/Kg)	XRPD	G5 Blank (mg/kg)	G3		G6		% recovery		
						Sample+ spike (mg/Kg)	Spike (mg/Kg)	Dup.+spike (mg/Kg)	Spike (mg/Kg)	G3 Sample+ spike	G6 Dup.+ spike	G4 LCS sample
299-E33-40-201.7	90-7062	<1.0 <i>WJ</i>	<1.0	N/A	<1.0	9.07	9.27	9.1	9.26	97.9	98.2	104.1
299-E33-40-201.7A	90-7063	<1.0	<1.0	N/A	<1.0	9.16	10.19	9.3	10.22	89.9	91.0	104.2
										mean	93.9	104.2
										Std. Dev.	5.7	0.1

G5 assumes average sample weight for mg/kg equivalent

## WATER SAMPLES

*JJ 02/25/41*

Sample ID#	PNL Log#	G1 Sample (ug/L)	G2 Sample dup. (ug/L)	XRPD	G5 Blank (ug/L)	G3		G6		% recovery		
						Sample+ spike (ug/L)	Spike (ug/L)	Dup.+spike (ug/L)	Spike (ug/L)	G3 Sample+ spike	G6 Dup.+ spike	G4 LCS sample
299-E33-40-200	90-7064	<10	<10	N/A	<10	47.25	45.75	46.39	45.75	103.3	101.4	113.3
299-E33-40-201	90-7065	<10	<10	N/A	<10	44.32	45.75	45.35	45.75	96.9	99.1	102.2
299-E33-40-200A	90-7066	<10	<10	N/A	<10	46.39	45.75	47.94	45.75	101.4	104.8	104.1
										mean	100.5	106.5
										Std. Dev.	3.3	5.9

Contract required detection limit for water = 10 ug/L  
 Contract required detection limit for soil = 1.0 mg/Kg

FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 mg/Kg, therefore free cyanide analysis was not performed on the samples in this set.

## GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid extraction procedure PNL-ALO-101 "Acid Digestion for Metal Analysis". The methodology is consistent with CLP procedure for acid digestion of waters and sediments. Acid extractions were conducted in 125 mL narrow mouth bottles. Extracts were analyzed by graphite furnace atomic absorption spectrometry (GFAAS) following procedure PNL-ALO-215 and PNL-ALO-216 for selenium and bismuth, respectively. Se and Bi procedures were consistent with CLP SOW 788 GFAAS Methods. Digestion of samples and GFAAS analysis were performed in building 325. The CLP SOW 788 and contract required hold times of 180 days and 120 days, respectively, were met.

Analyses for Se and Bi were conducted on a Perkin-Elmer 5100 without a Zeeman attachment. Quarterly Perkin-Elmer 5100 instrument detection limits (IDL) for Se and Bi were found to be 1.3 and 4.3  $\mu\text{g/L}$ , respectively.

Average recovery of Se digestion spike was 0% in soil and 87% in water. Lack of digestion spike recovery in soil and sediment samples was attributed to spectral interferences due to iron or other analytes. Use of a Zeeman background correction system should eliminate most interferences in Se analysis. Average recovery of post-digestion Se spike was 93% in soil and 92% in water.

Se analyses required dilution of the sample 1:10 in order to reduce interferences. This dilution prevented reporting Se values down to the CRDL of 0.5 mg/Kg in soil. Therefore Se in soil is reported down to 5.0 mg/Kg as specified in the 200-BP-1 PMP.

Average recovery of Bi digestion spike was 47% in soil and 81% in water. Average recovery of post-digestion Bi spike was 77% in soil and 95% in water.

Precision of sample duplicates was omitted as Se and Bi concentrations were below detection limits.

TABLE 6: SELENIUM ANALYSIS DATA  
ACID EXTRACTABLE SELENIUM IN SAMPLES

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample (mg/Kg)	Post Spike %Rec.	B2 Sample Dup (mg/Kg)	Post Spike %Rec.	%RPD	B5 Blank (mg/kg)	B3 Sample+ spike (mg/kg)	Spike (mg/kg)	B6 Dup.+spike (mg/kg)	Spike (mg/kg)	B3 Sample+ spike	%recovery B6 Dup.+ spike	B4 LCS sample
299-E33-40-201.7	90-7062	<5	R*	<5		N/A	<0.5	<5.0	0.1	<5.0	0.1	0.0	0.0	72.0
	90-7062-AS		97		105									
299-E33-40-201.7A	90-7063	<5	R*	<5		N/A								
	90-7063-AS		76											
mean												0.0	0.0	72.0

B5 assumes average B1-B2 sample weight for mg/kg equivalent

WATER SAMPLES

Sample ID#	PNL Log#	B1 Sample (ug/L)	Post Spike %Rec.	B2 Sample Dup (ug/L)	Post Spike %Rec.	%RPD	B5 Blank (ug/L)	B3 Sample+ spike (ug/L)	Spike (ug/L)	B6 Dup.+spike (ug/L)	Spike (ug/L)	B3 Sample+ spike	%recovery B6 Dup.+ spike	B4 LCS sample
299-E33-40-200	90-7064	<5		<5		N/A	<5	8.5	10.0	8.9	10.0	85.0	89.0	109.0
	90-7064-AS		86		92									
299-E33-40-201	90-7065	<5		<5		N/A								
	90-7065-AS		93											
299-E33-40-200A	90-7066	<5		<5		N/A								
	90-7066-AS		95											
mean												85.0	89.0	109.0

Contract required detection limit for water = 5 ug/L  
Contract required detection limit for soil = 0.5 mg/Kg

- (a) Used a dilution of ICV-2=26.4 ug/L
- (b) Analytical spike(AS)=10 ug/L
- (c) Pre-digestion spike=10 ug/L
- (d) LCS standard (ICV-2)
- (e) RPD only calculated if both sample and dup. are <DL

Reported values for Se in soil (except for B5 blank) follow a 1:10 dilution of digestate;  
thus the pre-digestive spikes are reduced to concentrations significantly  
below detection levels. The additional dilution increases detection limits  
by a factor of 10.

*1/2*  
02/25/91

TABLE 7: BISMUTH ANALYSIS DATA  
ACID EXTRACTABLE BISMUTH IN SAMPLES

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample (mg/Kg)	Post Spike %Rec.	B2 Sample dup. (mg/Kg)	Post Spike %Rec.	%RPD	B5 Blank (g/L)	Sample+ spike (g/L)	B3 Spike (g/L)	Dup.+spike (g/L)	B6 Spike (g/L)	B3 Sample+ spike	%recovery B6 Dup.+ spike	B4 LCS sample
299-E33-40-201.7	90-7062	<1	47	<1	80	N/A	<1	0.74	1.82	0.88	1.64	40	54	87
299-E33-40-201.7	90-7062-AS													
299-E33-40-201.7A	90-7063	<1	47	<1			<1							
299-E33-40-201.7A	90-7063-AS		71											
mean												40.0	54.0	87.0

B5 assumes average B1-B2 sample weight for mg/Kg equivalence

WATER SAMPLES

Sample ID#	PNL Log#	B1 Sample (ug/L)	Post Spike %Rec.	B2 Sample dup. (ug/L)	Post Spike %Rec.	%RPD	B5 Blank (ug/L)	Sample+ spike (ug/L)	B3 Spike (ug/L)	Dup.+spike (ug/L)	B6 Spike (ug/L)	B3 Sample+ spike	%recovery B6 Dup.+ spike	B4 LCS sample
299-E33-40-200	90-7064	<10		<10	97	N/A	<10	16.4	20.0	16.0	20.0	82.0	80.0	94.0
299-E33-40-200	90-7064-AS				93									
299-E33-40-201	90-7065	<10		<10			<10							
299-E33-40-201	90-7065-AS		96											
299-E33-40-200A	90-7066	<10		<10			<10							
299-E33-40-200A	90-7066-AS		94											
mean												82.0	80.0	94.0

Contract required detection limit for water = 60 ug/L  
Contract required detection limit for soil = 10 mg/Kg  
(a)Used a dilution of NBS Bi std.= 25 ug/L  
(b)Analytical spike(AS)=20 ug/L  
(c)Predigest spike=20ug/L  
(d)B4 for soils=LCS-0287+1200ug/L Bi spike (1:100 dil.)  
(e)RPD only calculated if both sample and dup. are <DL

*JF*  
02/25/91

**B1 - WESTINGHOUSE CHAIN OF CUSTODY,**

**SAMPLE ANALYSIS REQUEST FORMS**

**AND PNL SAMPLE RECEIPT FORMS**

**B01-001**

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. THOMPSON

Telephone 509-376-2153

Sample Collected by W.S. THOMPSON / RE STEFFLER Date 12/14/90

Time 0715, 0750, 1025, 1025  
1025

Sample Locations 200-BP-1 (200-EST) 299-E33-40 WEBSITE

Ice Chest No. ALPHA #2 POLYCOOLER Field Logbook and Page No. WHC-N-287-2 pg 94-97  
AND COLEMAN GRAY METAL #40 (SAMPLE #1,2,5)

Remarks all soil + water samples to be analyzed for 200-BP-1 Parameters  
of interest supporting TASK #6 OF the RI/FS see statement of work

Bill of Lading No. NA Offsite Property No. NA

Method of Shipment hand carry by ASL to 325 PNL LAB

Shipped to 325 PNL LAB (300 AREA)

Possible Sample Hazards none indicated with hand-held field instruments

Sample Identification

(1) 299-E33-40-200

1, 500ml. CLEAR GLASS; WATER; ANIONS-TRITIUM  
3, 1-liter, AMBER GLASS; WATER; 2ml. HNO<sub>3</sub>; Metals + rad  
3, 1-liter, Amber glass; water; 2ml NaOH; CN + Free CN

(4) 299-E33-40-201.7

1, 2-LITER; CLEAR GLASS; SOIL; 200-BP-1 PARAMETERS  
OF INTEREST

(2)

299-E33-40-201 WST 12/14/90

1, 500ml. clear glass; water; anions + tritium  
3, 1-liter, AMBER GLASS; WATER; 2ml. HNO<sub>3</sub>; Metals + rad  
3, 1-liter, amber glass; water; 2ml NaOH; CN + Free CN

(5) 299-E33-40-201.7A

1, 2-LITER; CLEAR GLASS; SOIL; 200-BP-1 Param.  
of Interest

(3) 299-E33-40-201A

1, 500ml. clear glass; water; anions + tritium  
3, 1-liter, AMBER GLASS; WATER; 2ml. HNO<sub>3</sub>; Metals + rad  
3, 1-liter, amber glass; water; 2ml. NaOH; CN + Free CN

Chain of Possession

Relinquished by: W.S. THOMPSON

Received by: R.J. Steffler

Date/Time: 12/14/90 12:50

Relinquished by: R.J. Steffler

Received by: James Rollins

Date/Time: 12/14/90 1:30

Relinquished by: James Rollins

Received by: James Rollins

Date/Time: 12/14/90 1:30

Relinquished by: James Rollins

Received by: James Rollins

Date/Time: 12/14/90 1:30

B01-002

A-6000-407 (04/90)



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W.S. THOMPSON / RZ. STEFFLER

Date Sampled 12/14/90 Time 0715 hours  
0850  
1025  
1025

Company Contact W.S. THOMPSON

Telephone (509) 3762153

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested 200-BP-1 PARAMETERS OF Interest see Statement of work.
① 299-E33-40-200	1, 500ml. clear glass;	WATER	anions + tritium
	3, 1-liter; AMBER GLASS	WATER, 2ml. HNO <sub>3</sub> ;	metals + rad. chem.
	3, 1-liter; amber glass	WATER, 2ml. NaOH;	CN + Free CN
② 299-E33-40-201	1, 500ml. clear glass	water	anions + tritium
	3, 1-liter amber glass	water; 2ml. HNO <sub>3</sub> ;	metals + rad. chem.
	3, 1-liter amber glass	water; 2ml. NaOH;	CN + Free CN
③ 299-E33-40-201A	1, 500ml. clear glass	water	anions + tritium
	3, 1-liter amber glass	water 2ml. HNO <sub>3</sub> ;	metals + rad. chem.
	3, 1-liter amber glass	water 2ml. NaOH;	CN + Free CN
④ 299-E33-40-201.7	1; 2-LITER; CLEAR GLASS; SOIL;		All 200BP-1 Parameters of Interest
⑤ 299-E33-40-201.7A	1, 2-LITER; CLEAR GLASS; SOIL;		All 200BP-1 Parameters of Interest

Field Information\*\* All of the above samples to be analyzed for 200-BP-1 Parameters of Interest

Special Handling and/or Storage no hazards indicated on hand-held field instruments

## PART II: LABORATORY SECTION

Received by James J. Koblentz  
Analysis Required See Above

Title Sr. Research Scientist Date 12/14/90

\*Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-003



SAMPLE RECEIPT FORM

Delivered by: R. Z. STEFFLER Date/Time: 12/14/90 1304

Received by: J. M. ROBBINS

Customer Sample Number(s): 299-E33-40-201.7

ALO Sample Number(s): 90-7062

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

*Shipment log and sample analysis request*

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: OK

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial. *OK*

Notes:

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). *OK*

6. Condition of Sample Vials. *OK*

7. Verification of Agreement or Nonagreement of Information on Receiving Documents. *OK*

8. Resolution of Problems or Discrepancies.

*N/A*

RETURN COMPLETED FORM TO PROJECT MANAGER

**B01-004**

SAMPLE RECEIPT FORM

Delivered by: R. Z. STEFFLER Date/Time: 12/14/90 1304  
Received by: J. M. ROBBINS  
Customer Sample Number(s): 299-E33-40-201.7A  
ALO Sample Number(s): 90-7063

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_
2. Additional Shipping Forms (list):  
Shipping log and sample analysis request
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent \_\_\_\_\_  
If Present, Condition: OK
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record  
or on Sample Vial. OK
- Notes:
5. Condition of Shipping Container (Verify that ice still exists such that  
samples are at refrigerated temperature). OK
6. Condition of Sample Vials. OK
7. Verification of Agreement or Nonagreement of Information on Receiving  
Documents. OK
8. Resolution of Problems or Discrepancies.  
N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

**B01-005**

SAMPLE RECEIPT FORM

Delivered by: R. Z. STEFFLER Date/Time: 12/14/90 1304

Received by: J. M. ROBBINS

Customer Sample Number(s): 299-E33-40-200

ALO Sample Number(s): 90-7064

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

*Shipping log and sample analysis request*

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: \_\_\_\_\_

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). *OK*

6. Condition of Sample Vials. *OK*

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

**B01-006**

SAMPLE RECEIPT FORM

Delivered by: RZ STEFFLER Date/Time: 12/14/90 1304

Received by: J. M. ROBBINS

Customer Sample Number(s): 299-E33-40-201

ALO Sample Number(s): 90-7065

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

*Shipping log and sample analyzer request*

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: \_\_\_\_\_

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). *OK*

6. Condition of Sample Vials. *OK*

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

**B01-007**

SAMPLE RECEIPT FORM

Delivered by: RZ. STEFFLER Date/Time: 12/14/90 1304

Received by: J. M. ROBBINS

Customer Sample Number(s): 299-E33-40-201A

ALO Sample Number(s): 90-7066

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

*Shipping log and sample analysis request*

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: OK

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial. OK

Notes:

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature) OK

6. Condition of Sample Vials. OK

7. Verification of Agreement or Nonagreement of Information on Receiving Documents. OK

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-008



# DATA PACKAGE VERIFICATION

DATE RECEIVED: 11/7/90

SYG #: Report 1, Rev. 0, TOC

LABORATORY: PNL 325 Lab

PROJECT: 200-BP-1

LABORATORY CONTACT: B.M. Gillispie

PROJECT COORDINATOR: J.A. Lerch

	PRESENT	ABSENT	TRACEABLE	REMARKS
Internal chain-of-custody	X			
Lab chain-of-custody		X		
Airbill		X		N/A Samples Hand Carried to Lab
Shipping Order		X		N/A Samples Hand Carried to Lab
Signature and Tally		X		N/A Samples Hand Carried to Lab
Hazardous Materials Shipping		X		N/A
Request for Analysis	X			
Case Narrative	X			
Data reporting forms	X			
Raw data	X			
Electronic media		X		N/A

☒ DATA PACKAGE VERIFIED AND ACCEPTED: J.M. Duncan 2-15-91  
Data Management Clerk Date

☐ DATA PACKAGE ACCEPTED WITH REVISIONS: \_\_\_\_\_  
Project Coordinator Date

☒ DATA UNUSABLE/DATA REJECTED: \_\_\_\_\_  
Project Coordinator Date  
2/15/91  
CONCURRED: Cham-H. [Signature] 2/15/91  
OSM Manager Date



Westinghouse  
Hanford Company

# OSM RCRA LEVEL C DATA ASSESSMENT

DATE 02/08/91 SAMPLES/MATRIX 49-578-157.5 48-50-176  
 REVIEWED BY JA Lerch *ff* - all samples 49-578-157.5D 48-50-176.7  
 LABORATORY PNL-325 begin w/699 prefix 49-578-160 48-50-168-1  
 CASE # TPP 16772 49-578-161 48-50-168-2  
 SDG # Report 1; Rev 0 50-538-EB 52-54-168.5  
50-538-155.7

## DATA ASSESSMENT SUMMARY - all soil

QUALITY CONTROL CHECK	ANALYSIS	TOC		
1. <u>Holding Time</u>	<u>0</u>	<u>0</u>	<u>    </u>	<u>    </u>
2. <u>Matrix Spike</u>	<u>0</u>	<u>0</u>	<u>    </u>	<u>    </u>
3. <u>Duplicate Analysis</u>	<u>X</u>	<u>X</u>	<u>    </u>	<u>    </u>
4. <u>Blanks</u>	<u>0</u>	<u>0</u>	<u>    </u>	<u>    </u>
5. <u>Calibration/Control Stds</u>	<u>0</u>	<u>0</u>	<u>    </u>	<u>    </u>
6. <u>Other QC - see attachment</u>	<u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>
7. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>
8. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>
9. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>
10. <u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>	<u>    </u>

0 = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: no major problems - all results  
acceptable w/qualification

NOTES: none

o Refer to the corresponding attachments for explanation of any problems.



RCRA LEVEL C QC

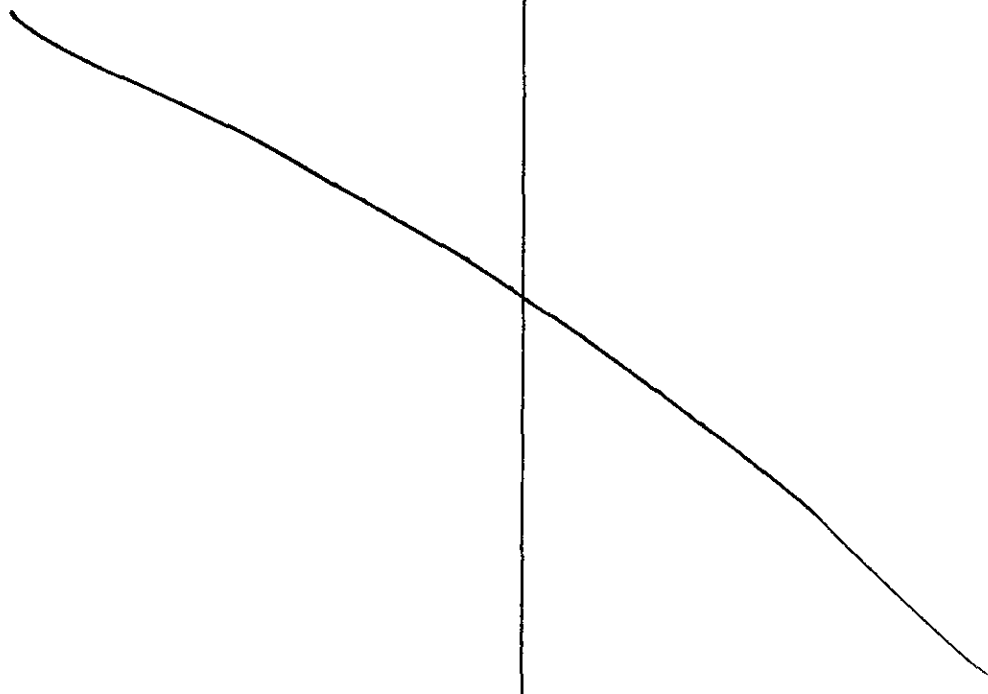
Name JA Lecch *ft* Date 02/08/91

QC Check: Holding time

COMMENTS: 14 day requirement met for  
all samples

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name JA Lerch *jl* Date 02/08/91

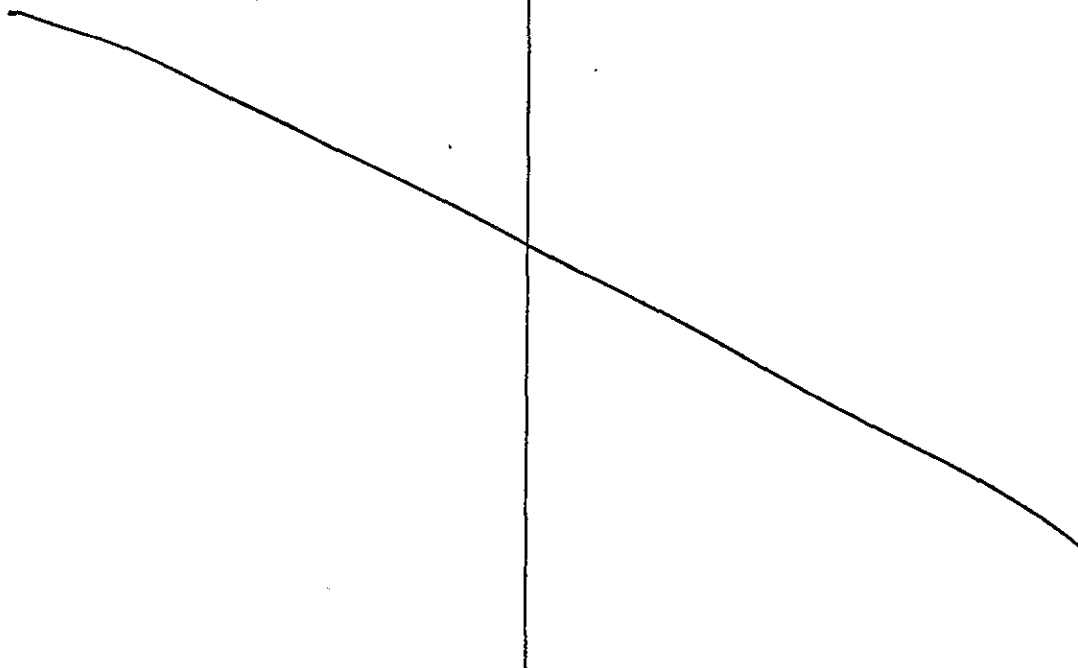
QC Check: Matrix Spike

COMMENTS: spike + spike duplicate 70 R acceptable

- no MS or MSD required by SOW or procedure

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name JA Lerch Date 02/08/90

QC Check: Duplicate Analysis

COMMENTS: all samples run in duplicate, some  
RPD's high (>15%)

ACTION: qualify associated results as  
per OSM guidelines

sample #	constituent	value/qual	sample #	constituent	value/qual
699-49-578-157.5	TOC	J			
699-49-578-157.50					
699-49-578-160					
699-50-538-EB					
699-50-538-155.7					

RCRA LEVEL C QC

Name JA Lerch Date 02/08/91

QC Check: Blanks

COMMENTS: daily blanks are used to set quantitation  
limits (See CASE NARRATIVE)  
evaluation of contamination cannot  
be made - all results sig > than  
any blank values

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

RCRA LEVEL C QC

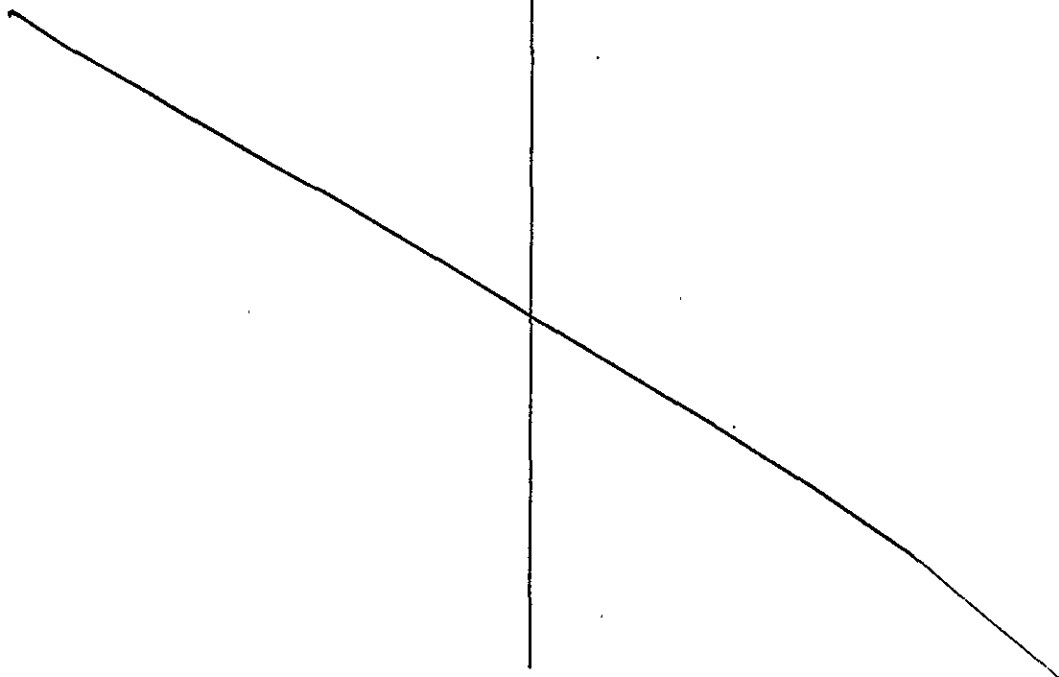
Name JA Lerch Date 02/08/91

QC Check: calibration/control Std

COMMENTS: glucose std used for calibration;  
recoveries acceptable

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

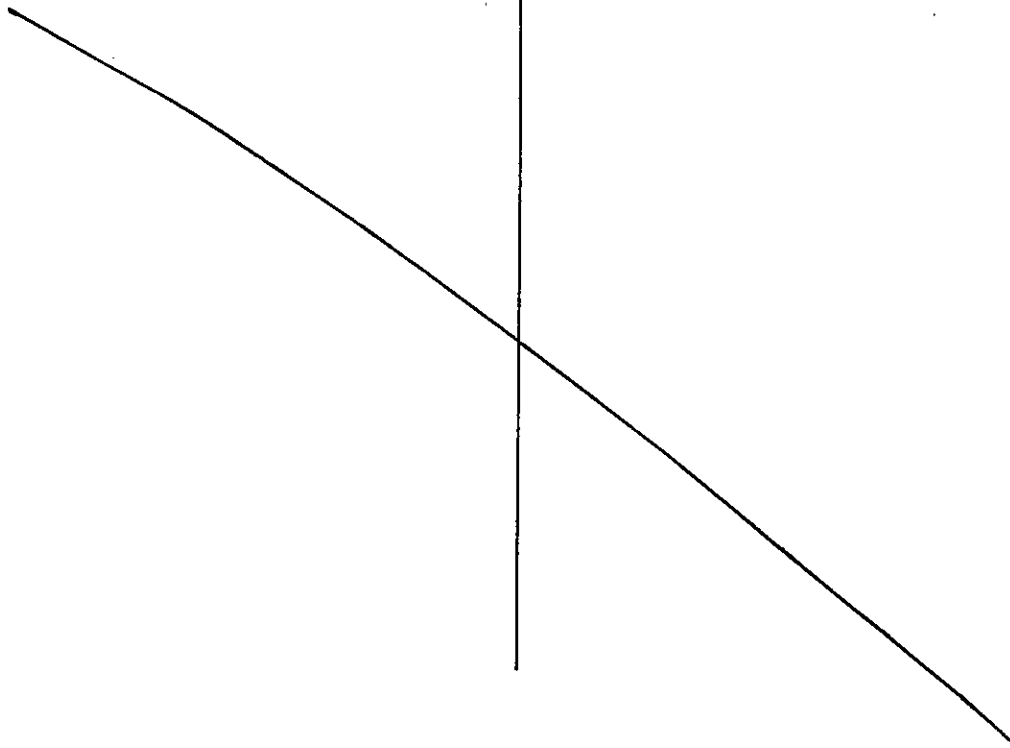
Name J A Lerch for Date 02/08/91

QC Check: other QC

COMMENTS: Table 2: ug C in sample = result -  
blank value; sample values  
may be biased low

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 1, Rev 0

Report 2, Rev 0

Report 3, Rev 0

TOTAL ORGANIC CARBON - soil  
sample value/qualifier

Sample Number	value/qualifier
Report 1	(ug/g)
49-57B-157.5	73 J
49-57B-157.5D	95 J
49-57B-160	69 J
49-57B-161	113
50-53B-EB	94 J
50-53B-155.7	43 J
48-50-168-1	176
48-50-168-176	149
48-50-168-2	131
48-50-176.7	221
52-54-168.5	280
Report 2	(mg/Kg)
49-57B-216	96.0 J
49-57B-216-A	52.2 J
49-57B-220	39.0 J
49-57B-229	50.0 J
50-53B-208	22.6 J
50-53B-208A	26.5
50-53B-214	14.1
50-53B-225	56.6 R
Report 3	(mg/Kg)
55-55-160	92.3
55-55-160-A	125
55-55-162	21.5 J
52-57-160	61.0
52-57-160-B	84.1
55-55-166	61.5
55-55-190	23.8
52-57-162.0	47.9

NR not reported and/or requested

all sample numbers begin with 699- prefix

200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 1, Rev 0

Report 2, Rev 0

Report 3, Rev 0

TOTAL ORGANIC CARBON - water  
sample value/qualifier

Sample Number	value (ug/ml)/qualifier
Report 1	
no water samples	
Report 2	
49-57B-216B	0.67 J
49-57B-216C	0.40 J
49-57B-216D	0.16 J
49-57B-229A	1.34 J
Report 3	
52-57-157-A	0.41
52-57-157-B	0.99
55-55-160-A	0.65

NR not reported and/or requested

all sample numbers begin with 699- prefix



## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Draft WHC Statement of Work and a Draft PNL Statement of Work which became the Draft Technical Project Plan (TPP) 17662. The analytical procedures required for analysis were defined in a letter to the Task Leader. This data report contains no technical assessment of the analytical results.

Eleven soil samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms in April and May of 1990. The samples were delivered at refrigerated temperature to Building 325 in the 300 Area. The samples were analyzed in the 325 building.

The requested analysis for these eleven soil samples was Total Organic Carbon by SW 846 Method 9060. The procedure used was PNL 7-40.37, which is comparable to SW 846 Method 9060. There were no further requests for analysis of the other parameters of interest addressed in the QAPjP ALO-001. The quality control (QC) requirements for each sample were defined in a letter to the Task Leader as directed by the client, WHC. The QC requirements outlined in SW 846 Method 9060 are for quadruplicate analysis of each sample. WHC directed PNL to analyze the samples only in duplicate with a method blank per each batch of samples analyzed. All QC data that exist are include in this Data Report/Package.

The data in this package are reported in Table 2. The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody and Sample Analysis Request Forms and one that contains the primary analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie  
B. M. Gillespie  
200-BP-1 Project Manager

11-05-90  
Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

J. L. Daniel  
J. L. Daniel  
PNL ACL Quality Representative

11/05/90  
Date

Table 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>
699-49-57B-157.5	90-3280
699-49-57B-157.5D	90-3281
699-49-57B-160	90-3282
699-49-57B-161	90-3283
699-50-53B-EB	90-3314
699-50-53B-155.7	90-3315
699-48-50-176	90-3460
699-48-50-176.7	90-3461
699-48-50-168-1	90-3462
699-48-50-168-2	90-3463
699-52-54-168.5	90-3728

## TOTAL ORGANIC CARBON ANALYSIS RESULTS

The sample and its accompanying QC samples were prepared by procedure PNL-7-40.37, Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer. The methodology is consistent with SW 846 Method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure and calculations.

With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major source of carbon in the blank is adsorbed CO<sub>2</sub> on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to determine the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit. For purposes of this report, the daily blank value is used as the lower quantification limit for the analyses. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported in this data package. This "method detection limit," defined as three times the standard deviation of the blank values, is ~5 µg of total organic carbon in the analytical

sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPjP ALO-001) ranged from less than 1% to 53%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard results (of the same Kodak  $\alpha$ -D Glucose standard) for this set of data, the recoveries ranged from 80.4% to 98%. The average recovery was 92% with a standard deviation of 5%. The conclusion is that the best that can be expected from the procedure (at concentrations >25 times the nominal detection limit) is a precision of  $\pm 5\%$  relative, and a bias (accuracy) of -8% on the average.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for the eleven sample analyses in this data report.

Table 2: 200-8P-1 Total Organic Carbon Analysis Data

WMC Sample ID#	PHL-ALO #	Sample wt. g	ug C Blank (Pt Boat in Ladle)	ug C Result	ug C in Sample	ug C/g Sample	% std dev of Dups	Date Sampled	Date Analyzed	Glucose Spike g	ug C Spike g	ug C (Spike) Sample + Blank) Observed	% Spike Recovery
699-49-578-157.5	90-3280	0.18792	4.75	37.29	32.54	173 J	26%	4/24/90	4/27/90				
"	"	0.19745	4.75	28.45	23.7	120		4/24/90	4/27/90				
699-49-578-157.50	90-3281	0.25495	4.75	29.06	24.31	95 J	39%	4/24/90	4/27/90				
"	"	0.31045	4.75	21.47	16.72	54		4/24/90	4/27/90				
699-49-578-160	90-3282	0.27366	4.75	23.53	18.78	69 J	19%	4/24/90	4/27/90				
"	"	0.27637	4.75	19.3	14.55	53		4/24/90	4/27/90				
699-49-578-161	90-3283	0.27576	3.16	34.41	31.25	113	1%	4/24/90	4/30/90				
"	"	0.34931	3.16	42.35	39.19	112		4/24/90	4/30/90				
699-50-538-EB	90-3314	0.18475	2.92	20.23	17.31	94 J	34%	4/25/90	5/01/90				
"	"	0.24803	2.92	17.13	14.21	57		4/25/90	5/01/90				
699-50-538-155.7	90-3315	0.29305	2.92	15.63	12.71	43 J	53%	4/25/90	5/01/90				
"	"	0.3047	2.92	31.92	29.05	95		4/25/90	5/01/90				
Spike													
699-49-578-157.50	90-3281	0.14141	4.8	-	(10.55)	-		4/24/90	5/03/90	0.0030	(1228)	1090.7	87.56
Spike Duplicate													
699-49-578-157.50	"	0.15612	4.8	-	(11.65)	-		4/24/90	5/03/90	0.0040	(1608)	1455.39	88.84
6699-48-50-168-1	90-3462	0.2176	4.67	43.02	38.35	176	15%	5/03/90	5/15/90				
"	"	0.26443	4.67	42.03	37.36	141		5/03/90	5/15/90				
699-48-50-176	90-3460	0.2063	12.48	43.29	30.81	149 *	1%	5/04/90	5/16/90				
"	"	0.2602	12.48	50.84	38.36	147 *		5/04/90	5/16/90				
699-48-50-168-2	90-3463	0.3129	4.67	45.72	41.05	131	8%	5/03/90	5/15/90				
"	"	0.30397	4.67	49.18	44.51	146		5/03/90	5/15/90				
699-48-50-176.7	90-3461	0.1986	12.48	56.34	43.86	221 *	1%	5/04/90	5/16/90				
"	"	0.1997	12.48	55.99	43.51	218 *		5/04/90	5/16/90				
699-52-54-168.5	90-3728	0.12935	4.42	40.65	36.23	280	10%	5/22/90	5/30/90				
"	"	0.11188	4.42	42.41	37.99	340		5/22/90	5/30/90				
"	"	0.1258	4.42	38.86	34.44	274		5/22/90	5/30/90				
"	"	0.12742	4.42	43.24	38.82	305		5/22/90	5/30/90				

JZ  
02/08/90

\* Results may be low due to uncertainty in blank value. Based on an average blank value of 5 ug C, the reported sample values may be ~20% low.

**B1 - WESTINGHOUSE CHAIN OF CUSTODY AND  
SAMPLE ANALYSIS REQUEST FORMS**

Westinhouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson JW Roberts Date 4/24/90 Time 0930, 0830, 1020  
Sample Locations 699-49-57B 1130  
Ice Chest No. RM #9 Field Logbook and Page No. WHC-N-385-1  
Remarks Soil samples in 125 ml bottles, on ice, sent to 325 PNL lab for  
analysis of Total Organic Carbon  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment handcarry on ASL sample van to 325 PNL lab  
Shipped to 325 Bldg, PNL

Sample Identification

- 1) 699-49-57B-157.5 (90-3280) analysis  
1, 125 ml, clear glass, soil, SW-846, Method 9060, TOC, chemical analysis wst 4/24/90
- 2) 699-49-57B-157.5 D (90-3281)  
1, 125 ml, clear glass, soil, SW-846, Method 9060, TOC, chemical analysis
- 3) 699-49-57B-160; 1, 125 ml, clear glass; soil; SW846, Method 9060, T.O.C.; chemical  
(90-3282) analysis
- 4) 699-49-57B161; 1, 125 ml, clear glass; soil; SW846, Method 9060, T.O.C.; chemical analysis  
(90-3283)

Chain of Possession

Relinquished by: <u>Larry J. Thompson</u>	Received by: <u>VM Steele</u>	Date/Time: <u>4/24/90 1245</u>
Relinquished by: <u>VM Steele</u>	Received by: <u>Quinn Z. Bellofatto</u>	Date/Time: <u>4/24/90 2:40</u>
Relinquished by: <u>Quinn Z. Bellofatto</u>	Received by: <u>Gerald A. Ross</u>	Date/Time: <u>4/27/90 8:10</u>
Relinquished by: "	Received by: "	Date/Time:





## PART I: FIELD SECTION

Date Sampled 4/24/90 Time 0830 hours

Telephone 1509 1.373-3818 <sup>085</sup> 1020.1130

[illegible]

Field Information\*\* soil samples to be shipped to 325 PNL/lab for TOC

46190 ~~SW846~~ SW846, Method 9060

Special Handling and/or Storage None

## PART II: LABORATORY SECTION

Received by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

### Analysis Required

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**



## PART 1: FIELD SECTION

Collector W. J. Thompson, T. W. Roberts Date Sampled 4/25/90 Time 0730 hours  
Company Contact W S Thompson Telephone (509) 373-3818 0750

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
699-50-538-EB	1, 125 ml, clear glass,	soil, SW 946	Method 9060, TOC (90-3314) <span style="float: right;">ANL</span>
699-50-538-155.7	1, 125 ml, clear glass,	soil, SW 946	Method 9060, TOC (90-3315)
2/1/2			

Field Information\*\* Soil samples to be analyzed for Total Organic Carbon, SW-846, Method 9060.

Special Handling and/or Storage Hand carry samples in ASL sample van to  
325 PNL Laboratory

## PART II: LABORATORY SECTION

Received by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_  
Analysis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

Westinhouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson, J.W. Roberts Date 4/25/90 Time 0730, 0750  
Sample Locations 699-50-53B wellsite  
Ice Chest No. RM#9, Gott Polycorder Field Logbook and Page No. WHS-N-385-2  
Remarks Soil samples to be analyzed for Total Organic Carbon;  
SW-846, Method 9060  
Bill of Lading No. N/A Offsite Property No. N/A  
Method of Shipment hand carry, samples in ASL sample van to 325 PNL  
Shipped to 325 PNL Laboratory

Sample Identification

PNL

- 1) 699-50-53B-EB -1,125ml, clear glass, soil, SW 846, Method 9060, TOC (90-3314)  
2) 699-50-53B-155.7 1,125ml, clear glass, soil, SW 846, Method 9060, TOC (90-3315)

Chain of Possession

Relinquished by: <u>Kendy S. Thompson</u>	Received by: <u>SM Steele</u>	Date/Time: <u>4/25/90 / 1230</u>
Relinquished by: <u>SM Steele</u>	Received by: <u>Matthew</u>	Date/Time: <u>4/25/90 1336 PM</u> <u>1436</u>
Relinquished by: <u>Matthew</u>	Received by: <u>Donald Ror</u>	Date/Time: <u>4/25/90 1400</u>
Relinquished by:	Received by:	Date/Time:

Westinhouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson, J.W. Roberts Date 5-4-90 Time 1000, 1130  
Sample Locations 699-48-50 P4-6  
Ice Chest No. RH#3 Field Logbook and Page No. WHC-N-287-2 #5 4/15/90  
Remarks Soil samples in 125 ml bottles, chilled on ice, sent to 325 PNL lab for TOC analysis  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment Handcarried in ASL sample van to 325 PNL lab in 300 area  
Shipped to 325 Bldg, PNL (300 area)

Sample Identification

1) 699-48-50-176  
1, 125 ml, clear glass, soil, SW-846, Method 9060 TOC Chemical analysis  
2) 699-48-50-176.7  
1, 125 ml, clear glass, soil, SW-846, Method 9060, TOC, Chemical analysis

Chain of Possession

Relinquished by: <u>J. W. Roberts</u>	Received by: <u>R. J. Styll</u>	Date/Time: <u>5-4-90 1209</u>
Relinquished by: <u>R. J. Styll</u>	Received by: <u>Deana Z. Bellagatto</u>	Date/Time: <u>5-4-90 2:26 p</u>
Relinquished by: <u>Deana Z. Bellagatto</u>	Received by: <u>S. V. Archer</u>	Date/Time: <u>5-14-90 / 1353</u>
Relinquished by:	Received by:	Date/Time:



## PART I: FIELD SECTION

Collector W.S. Thompson Date Sampled 5-4-90 Time 1130 hours  
Company Contact W.S. Thompson, J.W. Roberts Telephone (509) 373-3818

[illegible]

Field Information\*\* soil samples to be shipped (Via DOE vehicle) to 325 PNL lab for TAC analysis. SW846, Method 9060.

Special Handling and/or Storage Keep samples chilled.

## PART II: LABORATORY SECTION

Received by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_  
Analysis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

Westinhouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson, T.W. Roberts Date 5/3/90 Time 1415, 1415  
Sample Locations 699-48-50  
Ice Chest No. RM #3 Field Logbook and Page No. WHC-N-287-2, p. 1-2  
Remarks Soil samples in 125ml bottles, on ice, sent to 325 PNL lab for analysis  
of Total Organic Carbon (TOC)  
Bill of Lading No. N/A Offsite Property No. N/A  
Method of Shipment Hand carry on ASL sample van to 325 PNL lab, 325 Bldg., PNL  
Shipped to 325 Bldg., PNL

Sample Identification

1) 699-48-50-168-1  
1, 125 ml, clear glass, soil, SW846, Method 9060, TOC, chemical analysis  
2) 699-48-50-168-2  
1, 125 ml, clear glass, soil, SW846, Method 9060, TOC, chemical analysis

Chain of Possession

Relinquished by: <u>James W. Roberts</u>	Received by: <u>R. Z. Styll</u>	Date/Time: <u>5-3-90 1451</u>
Relinquished by: <u>R. Z. Styll</u>	Received by: <u>Devin L. Bellomyatto</u>	Date/Time: <u>5-4-90 2:26 p</u>
Relinquished by: <u>Devin L. Bellomyatto</u>	Received by: <u>S. V. Orban</u>	Date/Time: <u>5-14-90 / 1355</u>
Relinquished by:	Received by:	Date/Time:



## PART I: FIELD SECTION

Date Sampled 5/3/90 Time 1415 hours

Telephone (509) 373-3818

1) 699-48-5D-168-1; 1, 125 ml, clear glass, soil, SW 846, Method 9060, TDC; chill on ice  
2) 699-48-5D-168-2; 1, 125 ml, clear glass, soil, SW 846, Method 9060, TDC; chill on ice

Special Handling and/or Storage None

## PART II: LABORATORY SECTION

**Analysis Required** \_\_\_\_\_

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**



## PART 1: FIELD SECTION

Date Sampled 5/22/90 Time 1020 hours

Telephone (509) 373-3818

W.S.S.

Special Handling and/or Storage None

**PART II: LABORATORY SECTION**

Received by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

## Analysis Required

Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**



Westinhouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson Date 5/22/90 Time 1020  
Sample Locations 1699-52-54 (200' operable unit ground under borehole)  
Ice Chest No. RM#7 poly cooler Field Logbook and Page No. WHC-287 WHC-N-287-2  
Remarks Soil samples in 125 ml. bottles, on ice, sent to 325 PNL lab for analysis  
of TOTAL ORGANIC CARBON (TOC)  
Bill of Lading No. N/A Offsite Property No. N/A  
Method of Shipment hand carry in EFSG van to 325 lab  
Shipped to 325 Bldg., PNL

Sample Identification

1) 1699-52-54-168.5  
1, 125 ml. amber glass, Soil, SW-846, Method 9060, TOC, chemical analysis

Chain of Possession

Relinquished by: <u>Wendy S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>C.S. McClellan</u> <u>C.S. McClellan</u>	Date/Time: <u>5/22/90 13:45</u>
Relinquished by: <u>C.S. McClellan</u> <u>C.S. McClellan</u>	Received by: <u>V. Anderson</u> <u>V. Anderson</u>	Date/Time: <u>5-22-90 13:58 hrs</u>
Relinquished by: <u>V. Anderson</u> <u>V. Anderson</u>	Received by: <u>22 A.R. ...</u> <u>22 A.R. ...</u>	Date/Time: <u>5-30-90 1340</u>
Relinquished by:	Received by:	Date/Time:

SAMPLE RECEIVING/LOG-IN INFORMATION

Sample Log-In Information

Person Receiving Sample: Dale Archer Date 5-22-90  
Sample Log-In Number(s): 90-3728 \*  
Client Sample Number(s): 699-52-54-168.5 \*  
In-House Sample Number: \_\_\_\_\_ \*  
Results Required By: 6/5/90 Client/Project: W.S. Thompson  
Work Package/Charge Code: \_\_\_\_\_ QA Plan: \_\_\_\_\_  
MA-70 Impact Level: II EPA Analytical Level: \_\_\_\_\_  
Requested Analyses: TDC

Lab Technical Leader: Bob Stromatt  
Client Point of Contact: <sup>D-8</sup> W.S. Thompson Phone: 3-3818  
Sample Archive Requirements: N/A  
Hazardous Waste Disposal Issues: N/A  
Special Requirements: N/A

Sample Receiving Information

Condition of Shipping Container: good  
Chain-of-Custody Records Included? Yes X No \_\_\_\_\_  
Chain-of-Custody Requirements: yes  
Condition of Samples: good  
Discrepancies in Shipping Records/Samples? Yes \_\_\_\_\_ No X  
Sample Storage Location: Lab 301-A refrigerator  
Sample Storage Requirements: 4°C ± 2°C  
Sample Custodian: Dale Archer

\* See back of form if more than one sample number per page

Attachment 9

Pacific Northwest Laboratory, 200-BP-1, Total Organic Carbon

Data Package 2

200-BP-1, Total Organic Carbon  
Data Package 2

## DATA PACKAGE VERIFICATION

DATE RECEIVED: 11/27/90

SEC 1: Report 2, Rev. 0, TOC

LABORATORY: PNL 325 Lab

PROJECT: 200-BP-1

LABORATORY CONTACT: B.J.M. Gillispie

PROJECT COORDINATOR: J.A. Lerch

	PRESENT	ABSENT	TRACEABLE	REMARKS
Internal chain-of-custody	X			
Lab chain-of-custody	X			
Airbill		X		N/A Samples Hand Carried to Lab
Shipping Order		X		N/A Samples Hand Carried to Lab
Signature and Tally		X		N/A Samples Hand Carried to Lab
Hazardous Materials Shipping		X		N/A
Request for Analysis	X			
Case Narrative	X			
Data reporting forms	X			
Raw data	X			
Electronic media		X		N/A

DATA PACKAGE VERIFIED AND ACCEPTED: J.M. Duncan 2/15/91  
Data Management Clerk Date

DATA PACKAGE ACCEPTED WITH REVISIONS: \_\_\_\_\_  
Project Coordinator \_\_\_\_\_ Date \_\_\_\_\_

~~DATA UNUSABLE/ DATA REJECTED:~~ Jeff Zurek 2/15/91  
Project Coordinator Date  
CONCURRED: (Karl H. Hoenes) 2/15/91  
OSM Manager Date



Westinghouse  
Hanford Company

# OSM RCRA LEVEL C DATA ASSESSMENT

DATE <u>02/09/91</u>	SAMPLES/MATRIX <u>49-578-216</u>	<u>49-578-229</u>
REVIEWED BY <u>JA Lerch</u>	-all samples begin w/699	<u>49-578-216A</u> <u>49-578-299A</u>
LABORATORY <u>PNL-325</u>	Prefix	<u>49-578-216B</u> <u>50-538-208</u>
CASE # <u>TPP 16772</u>		<u>49-578-216C</u> <u>50-538-208A</u>
SDG # <u>Report 2; Rev 0</u>		<u>49-578-220</u> <u>50-538-214</u>
<u>TOC</u>		<u>49-578-216D</u> <u>50-538-225</u>

## DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	TOC		
1. <u>Holding time</u>	<u>X</u>			
2. <u>Spike Analysis</u>	<u>X</u>			
3. <u>Duplicate Analysis</u>	<u>X</u>			
4. <u>Blanks</u>	<u>O</u>			
5. <u>Calibrations/Control Std</u>	<u>O</u>			
6. <u>Other QC</u>	<u>O</u>			
7. _____	_____			
8. _____	_____			
9. _____	_____			
10. _____	_____			

O = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: sample result for 699-50-538-225 unusable  
(R) due to high duplicate std-dev; all other  
results acceptable w/qualification

NOTES: see "Other QC" for table of sample #'s /matrix

o Refer to the corresponding attachments for explanation of any problems.

RCRA LEVEL C QC

Name JA Lerch *JA* Date 02/07/91

QC Check: Holding Time

COMMENTS: Holding time (14 days) exceeded on  
several samples

ACTION: qualify results as per ASM guidelines

sample #	constituent	value/qual	sample #	constituent	value/qual
699-49-578-216	TOC	J			
699-49-578-216-A					
699-49-578-220					
699-49-578-216B					
699-49-578-216C					
699-49-578-216D					
699-49-578-229A					

RCRA LEVEL C QC

Name JA Lerch

Date 02/07/91

QC Check: Spike Analysis

COMMENTS: some water spike recoveries low  
- no spikes on soil samples (none were  
required by the SOW or PNC procedure)

ACTION: qualify results as per OSM  
guidelines

sample #	constituent	value/qual
699-49-57B-216B	TOC	J
699-49-57B-216C		
699-49-57B-216D		

sample #	constituent	value/qual
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RCRA LEVEL C QC

Name JA Lerch / J Date 02/09/91

QC check: Duplicates

COMMENTS: several dup std Dev high  
-Dev for 699-49-53B-225 very high (88%)

ACTION: quality results as per OSM  
guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------

699-49-57B-216  
699-49-57B-229  
699-50-538-208  
699-50-538-225  
699-49-57B-216C

TOC

J  
J  
J  
R  
J



RCRA LEVEL C QC

Name JA Lerch

Date 02/09/91

QC Check: Blanks

COMMENTS: daily blanks are used to set  
quantitation limits (see CASE NARRATIVE)  
- evaluation of possible contamination  
cannot be made

ACTION: none

sample # constituent value/qual

sample # constituent value/qual

RCRA LEVEL C QC

Name JA Lerch Date 02/09/91

QC Check: Calibrations / Control Stds.

COMMENTS: calibration and control std 70R  
acceptable

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

RCRA LEVEL C QC

Name JA Lerch *jl* Date 02/09/91

QC Check: Other QC

COMMENTS: none

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------

## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the PNL Technical Project Plan (TPP) 17662 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples was Total Organic Carbon. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates and methods blanks were analyzed. All QC data that exist are include in this Data Package/Report.

The data in this package are reported in separate tables for soil samples (Table 2) and water samples (Table 3). The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms and one that contains the primary total organic carbon analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPjP ALO-001, for completeness. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie  
B. M. Gillespie  
200-BP-1 Project Manager

11-26-90  
Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

J. L. Daniel  
J. L. Daniel  
PNL ACL Quality Representative

11/26/90  
Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
699-49-57B-216	90-5337	Soil
699-49-57B-216A	90-5338	Soil
699-49-57B-216B	90-5339	Water
699-49-57B-216C	90-5340	Water
699-49-57B-220	90-5341	Soil
699-49-57B-216D	90-5342	Water
699-49-57B-229	90-5348	Soil
699-49-57B-299A	90-5349	Water
699-50-53B-208	90-5354	Soil
699-50-53B-208A	90-5355	Soil
699-50-53B-214	90-6702	Soil
699-50-53B-225	90-6703	Soil

## TOTAL ORGANIC CARBON ANALYSIS RESULTS

The soil samples and their accompanying QC samples were prepared by procedure PNL-7-40.37, Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer. The methodology is consistent with SW 846 Method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure and calculations. The water samples and their accompanying QC samples were prepared by procedure PNL-7-40.7, Solutions Analysis: Carbon. Analysis for both soil and water samples was performed in building 325 in the 300 area.

### Soil Samples

With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major source of carbon in the blank is adsorbed CO<sub>2</sub> on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to determine the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit. For purposes of this report, the daily blank value is used as the lower quantification limit for the analyses. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported in this data package. This "method detection limit," defined as three times the standard deviation of the blank values, is  $\sim 5 \mu\text{g}$  of total organic carbon in the analytical sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPjP ALO-001) ranged from less than 2% to 89%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received and their moisture content. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. The analyst followed the accepted protocol of mixing the sample but heterogeneity still remained as demonstrated by the duplicate results. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard results (of the same Kodak  $\alpha$ -D Glucose standard) for this set of data, the recoveries ranged from 88% to 102%. The average recovery was 97.5% with a standard deviation of 4%. The conclusion is that the precision from this set of data is  $\pm 4\%$  relative, and a bias (accuracy) of  $-3\%$  on the average.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for all but three of the soil sample analyses in this data report. The three analyses that failed to meet hold times were performed two days late due to the required 100% real time surveillance backlog by the QA engineers. The "late" analyses of the samples has no impact on the results.



### Water Samples

With the Dohrman DC80 total organic carbon, a check standard is injected into the instrument repetitively until two successive results are within 1% relative. This standard value is taken as the one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. An average "method detection limit" for this analytical method is estimated from past analyses at 0.7 mg/ml.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations ranged from less than 1% to 25%. This variability of difference is mostly attributed to the small amounts of total organic carbon in the water samples. The sample results are near detection limits.

At least one standard is analyzed daily (in at least duplicate) as a one point calibration of the instrument. Upon review of the standard results for this set of data, the recoveries ranged from 95% to 105%. The average recovery for the 10 ppm standard was 100% with a standard deviation of 5%. The conclusion is that the precision from this set of data is  $\pm 5\%$  relative, and a bias (accuracy) of 0 on the average. The spike recoveries, however, were not as good. The average recovery was 71% with a standard deviation of 19%. The poor recoveries are attributed to spiking at 2 times the detection limit (detection limit of about 0.7 to 0.8 ppm). The standard deviation of the spike recoveries that are so near the detection limit is expected to be larger than if samples were spiked at five to ten times the detection limit. The spike sample and spike blank analysis was not requested in the TPP or the client SOW for TOC analysis.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was not met for the water sample analyses in this data report. Upon analysis of the samples within the hold time, the results were found to be extremely poor. The instrument was in need of repair. Samples were reanalyzed as soon as the instrument was repaired. The "late" analysis of the samples has no significant impact on the results as the water samples were properly acidified in the field prior to delivery.

Table 2: 200-BP-1 Total Organic Carbon Analysis Data  
Soil Samples

WHC Sample #	PNL Sample #	Sample Type	Sample Wt, g	ug C Result	ug C in Sample	ng C/Kg Sample	% Std Dev of Dups	Date Sampled	Analyzed
699-49-57B-216	90-5337-1	Sample	0.10728	15.42	10.3	96.0 J	19.48	10-01-90	10-16-90
" "	90-5337-2	Duplicate	0.11847	13.74	8.62	72.8		10-01-90	10-16-90
" "	90-5337-4	Blank				5.12			10-16-90
699-49-57B-216-A	90-5338-1	Sample	0.15658	13.3	8.18	52.2 J	1.81	10-01-90	10-16-90
" "	90-5338-2	Duplicate	0.18086	14.33	9.21	50.9		10-01-90	10-16-90
" "	90-5338-4	Blank				5.12			10-16-90
699-49-57B-220	90-5341-1	Sample	0.20066	11.98	7.82	39.0 J	3.55	10-02-90	10-17-90
" "	90-5341-2	Duplicate	0.177	10.72	6.56	37.1		10-02-90	10-17-90
" "	90-5341-4	Blank				4.16			10-17-90
699-49-57B-229	90-5348-1	Sample	0.25607	17.61	12.79	50.0 J	37.42	10-08-90	10-18-90
" "	90-5348-2	Duplicate	0.2927	29.96	25.14	85.9		10-08-90	10-18-90
" "	90-5348-4	Blank				4.82			10-18-90
699-50-53B-208	90-5354-1	Sample	0.12673	7.68	2.86	22.6 J	53.21	10-10-90	10-18-90
" "	90-5354-2	Duplicate	0.1192	6.04	1.22	10.2		10-10-90	10-18-90
" "	90-5354-4	Blank				4.82			10-18-90
699-50-53B-208A	90-5355-1	Sample	0.13256	8.33	3.51	26.5	7.15	10-10-90	10-18-90
" "	90-5355-2	Duplicate	0.16214	9.57	4.75	29.3		10-10-90	10-18-90
" "	90-5355-4	Blank				4.82			10-18-90
699-50-53B-214	90-6702-1	Sample	0.30895	9.17	4.35	14.1	9.42	10-11-90	10-18-90
" "	90-6702-2	Duplicate	0.31202	9.84	5.02	16.1		10-11-90	10-18-90
" "	90-6702-4	Blank				4.82			10-18-90
699-50-53B-225	90-6703-1	Sample	0.21405	16.94	12.12	56.6 * R	88.84	10-12-90	10-18-90
" "	90-6703-2	Duplicate	0.22741	61.2	56.38	248		10-12-90	10-18-90
" "	90-6703-4	Blank				4.82			10-18-90

\* Sample was very wet.

Detection Limits for the three blank results above (3 times std. dev.) is 1.5ppm.

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040, 325 Bldg., rm 313. Data reported from LRB 52996, pp 48-51.

Relative Standard Deviation of the nine standards analyzed is 1.95%.

*JF*  
10/2/91

Table 3: 200-BP-1 Total Organic Carbon Analysis Data  
Water Samples

WHC Sample #	PNL Sample #	Sample Type	ug/mL Sample	Ave. ug/mL Sample	RSD of Dups (%)	Spike %Rec	C4 Cntrl %Rec	Lab Cntrl %Rec	Date Sampled	Analyzed
		10ppm Lab Cntrl	10.1 10.5	10.3				103		
699-49-57B-216B	90-5339-1	Sample	0.67	0.63	9.0				10-01-90	10-24-90
	90-5339-2	Duplicate	0.59							
	90-5339	TriPLICATE	0.65	0.61	9.3					
	"	Quadruplicate	0.57							
	90-5339-3	Sample+Spike	1.46	1.38	8.2	50				
	"		1.3							
	90-5339-4	Blank+Spike	1.16	1.19	3.6		77			
	"		1.22							
	90-5339-5	Blank	0.05	0.03						
	"		0.004							
	90-5339-6	Dupl+Spike	1.57	1.46	11	56				
	"		1.35							
699-49-57B-216C	90-5340-1	Sample	0.40	0.34	25				10-01-90	10-24-90
	90-5340-2	Duplicate	0.28							
	90-5340-3	Sample+Spike	1.40	1.30	11	64				
	"		1.20							
699-49-57B-216D	90-5342-1	Sample	0.16	0.17	4.3				10-02-90	10-24-90
	90-5342-2	Duplicate	0.17							
	90-5342-3	Sample+Spike	1.40	1.35	5.2	79				
	"		1.30							
		10ppm Lab Cntrl	9.3 9.1 9.9	9.4				94		
		10ppm Lab Cntrl	10.0 9.4 10.1	9.8				98		
699-49-57B-229A	90-5349-1	Sample	1.34	1.33	1.1				10-08-90	10-25-90
	90-5349-2	Duplicate	1.32							
	90-5349-3	Sample+Spike	2.94	2.88	2.9	103				
	"		2.82							
		10ppm Lab Cntrl	10.6 10.4	10.5				105		

Total Organic Carbon by PNL Procedure 7-40.7, on Instrument WA64102,  
325 Bldg., rm 400. Data reported from LRB 53093, pp 55.

Samples and Controls spiked at 1.5 ppm. The 1.5 ppm spike level is about 2xDL  
and therefore spikes exhibit somewhat poor recovery

*J*  
2/09/91

**B1 - WESTINGHOUSE CHAIN OF CUSTODY,**

**SAMPLE ANALYSIS REQUEST FORMS**

**AND PNL SAMPLE RECEIPT FORMS**

**BC1-001**

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/2/90 1600

Received by: M W LRIE

Customer Sample Number(s): (-99-49-570-)  
216, 216-A, 216-B, 216-C

ALO Sample Number(s): 90-5337, 90-5338, 90-5339 - 90-5340

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):

SAMPLE ANALYSIS REQUEST

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: 90-5337 Sealed only against CRP - not bottle  
OTHERS OKAY

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

PICKED INTO 325 BLDG BY STEFFLER COULD NOT  
VERIFY SHIPPING CONTAINER. V FELT COLD  
SAMPLES

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

AGREEMENT MWW

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

BC1-302

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: W. S. Thompson Telephone 373-3818  
Sample Collected by: R. F. Still Date: 10/1/90 Time: 1400  
Sample Locations: 699-49-57B  
Ice Chest No.: SI 5501 POLY 3501 52 Field Logbook and Page No.: W41C-N-277-2-2221, 2222  
Remarks: samples from 699-49-57B to be carried by ASL van for  
analysis to 200-AP-1 TDC.  
Bill of Lading No.: CNA Offsite Property No.: N/A  
Method of Shipment: Van / ASL van  
Shipped to: hand carry to 325 PNL LAB. via ASL LAB.  
Possible Sample Hazards: none indicated by field instruments  
VL

Sample Identification

1) 699-49-57B-216

1,250 ml amber glass aquifer sample, SW946 Method 9060 TDC.

2) 699-49-57B-216-A

1,250 ml amber glass aquifer sample, SW946 Method 9060 TDC.

3) 699-49-57B-216-B

1,125 ml plastic bottle, Method 9060 TDC. water, 2ml HCL

4) 699-49-57B-216-C

1,125 ml plastic bottle, Method 9060 TDC. water, 2ml HCL

Chain of Possession

Relinquished by: <u>W. S. Thompson</u>	Received by: <u>R. F. Still</u>	Date/Time: <u>10/1/90</u>
Relinquished by: <u>R. F. Still</u>	Received by: <u>W. S. Thompson</u>	Date/Time: <u>10/2/90 1600 HRS</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

BCI-303

A-6000-407 (04/90)



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W. S. Thompson / RE Suttler Date Sampled 10/1/90 Time 5:40 hours  
Company Contact W. S. Thompson Telephone (509) 373-3815 1055

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) 699-49-57A-216	1, 250 ml amber glass	aqueous soil, SW 846	Method 9060 - TOC
2) 699-49-57B-216-A	1, 250 ml amber glass	aqueous soil, SW 846	Method 9060, T.O.C.
3) 699-49-57B-216-B	1, 125 ml, plastic bottle	Method 9060	TOC, 2 ml HCl preservative
4) 699-49-57C-216-C	1, 125 ml, plastic bottle	Method 9060	TOC, 2 ml HCl preservative
<div>190</div> <div>10/1/90</div>			

Field Information\*\* samples hand carried to 325 PNL Lab.

Special Handling and/or Storage keep cool on wet ice

## PART II: LABORATORY SECTION

Received by M. W. Th... Title Group Leader Date 10/2/90  
Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

BC1-304

SAMPLE RECEIPT FORM

Delivered by: STEFFLER Date/Time: 10/2 1600

Received by: M. W. URIE

Customer Sample Number(s): 699-49-57B-220, 699-49-57B-216D

ALO Sample Number(s): 90-5341 90-5342

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐

2. Additional Shipping Forms (list):  
REQ. FOR SAMPLE ANALYSIS

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent ☐

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

PICKED INTO 325 BLDG BY STEFFLER COULD NOT  
VERIFY SHIPPING CONTAINER. SAMPLES FELT COLD

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

AGREE MWL

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

BC1-305



Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: W S Thompson Telephone 373-3818  
Sample Collected by W S Thompson R2 Stettin Date 10/2/90 Time 0830, 0750  
Sample Locations 699-49-57B; 600 AREA; just north of glycols  
Ice Chest No. 1 - SLEEPY POLYCOOLER Field Logbook and Page No. LWHC-N-257-2 pg. 24-  
Remarks Samples to be collected and shipped to 325 PNL LAB  
Analysis of SW846, 9060, Total Organic Carbon  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry in ASL sample van  
Shipped to 325 PNL LAB  
Possible Sample Hazards none indicated with field instruments

Sample Identification

- 1) 699-49-57B-230  
1,250 ml, amber glass, soil, Method 9060 T.O.C. analysis
- 2) 699-49-57B-216 D, 1,125 ml plastic, 2 ml HCL, water, Method 9060 T.O.C.

Chain of Possession

Relinquished by: <u>W. S. Thompson</u> <u>Handy S Thompson</u>	Received by: <u>R.2 Stettin</u> <u>R.3 Stettin</u>	Date/Time: <u>10/2/90 1010 HRS</u>
Relinquished by: <u>R.2 Stettin</u>	Received by: <u>M. W. [unclear]</u>	Date/Time: <u>10/2/90 1600 HRS</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by: <u>BOB-336</u>	Date/Time:



## PART I: FIELD SECTION

Date Sampled 10/2/90 Time 0830 hours

Telephone (509) 373-3818

Special Handling and/or Storage Keep chilled on wet ice - hand  
deliver to 325 PNL LAB.

Date 10/2/90

### Analysis Required

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

BCA-007

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/9/90 8:05  
Received by: M. Urie  
Customer Sample Number(s): 699-49-57B-229 699-49-57B-299A  
ALO Sample Number(s): 90-5348 90-5349  
*SOIL* *WATER*

1. Customer Chain-of-Custody Form: Present ✓ Absent \_\_\_\_\_
2. Additional Shipping Forms (list):  
Request for Analysis  
RSR
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ✓ Absent \_\_\_\_\_  
If Present, Condition: GOOD
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.  
Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).  
SAMPLE HAND DELIVERED TO 325 BLDG - ICE NOT  
VERIFIED - SAMPLES COLD
6. Condition of Sample Vials.  
GOOD
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.  
Agree mw
8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

BC1-108

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone 373-3818  
Sample Collected by W.S. Thompson; R.Z. Still Date 8/10/90 Time 1345; 1350  
Sample Locations 699-49-S7B-229  
Ice Chest No. "SLEEPY POLYCOOLER" Field Logbook and Page No. WHC-N-287-2 pg 36-38  
Remarks Samples to be analyzed for 260-BP-1 Total Organic Carbon Analysis  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry by ASL sample van to 325 PNL  
Shipped to 325 PNL Lab  
Possible Sample Hazards none indicated with field instruments

Sample Identification

1) 699-49-S7B-229 90-5348  
1, 120ml, amber glass, soil; TOC; Method 9060  
2) 699-49-S7B-229 A 90-5349  
1, 250ml, amber glass; water; TOC; Method 9060; 1 ml H<sub>2</sub>SO<sub>4</sub> added

Chain of Possession

Relinquished by: W.S. Thompson

Received by: RZ Still

Date/Time:

10/8/90 1435

Relinquished by:

Received by:

Date/Time:

10/9/90 8:05

Relinquished by:

Received by:

Date/Time:

Relinquished by:

Received by:

Date/Time:

BC1-309



**PART I: FIELD SECTION**

Collector W. S. Thompson ; RZ Steffler Date Sampled 10/8/90 Time 1345 hours  
Company Contact W. S. Thompson Telephone (509) 373-3818 <sup>1380</sup>

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
699-49-57B	-229 ; 1, 120ml, amber glass, soil	TOC ; Method 9060	
699-49-57	-229 A ; 1, 250ml, amber glass ; water	TOC Method 9060 ; 1 ml H <sub>2</sub> SO <sub>4</sub> added	
NA			

Field Information\*\* Samples to be analyzed for Total ~~as is~~ organic carbon;  
Method 9060. 10/8/90 WST

Special Handling and/or Storage hand carry to 325 PNL Lab for analysis

## PART II: LABORATORY SECTION

Received by M. W. White Title Group Leader Date 10/9/90  
Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

**A-6000-406 (07/89)**

BCA-320

SAMPLE RECEIPT FORM

Delivered by: Stuffer Date/Time: 10/10/90 13:05

Received by: Chie

Customer Sample Number(s): 699-50538-208, 208A

ALO Sample Number(s): 90-5354, 5355

1. Customer Chain-of-Custody Form: Present 2 Absent \_\_\_\_\_

2. Additional Shipping Forms (list):

Request for Analyzer

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ✓ Absent \_\_\_\_\_

If Present, Condition: Good

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

Iced

6. Condition of Sample Vials.

Good

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree/ma

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

BC1-111

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact Wendy S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson/RZ Steffler Date 10/10/90 Time 0900-0900  
Sample Locations 699-50-53B, well site in 300 AREA, north of 200 EAST  
Ice Chest No. \_\_\_\_\_ Field Logbook and Page No. WLC-N-287-2 pg 39-41  
Remarks Samples collected for analysis of 300-BP-1 RI/ES - Samples to be  
analyzed for Total Organic Carbon (T.O.C.) and inorganic carbon (I.C.)  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment Hand carry to 325 PNL LAB / 300 AREA in 15L Sample Vial  
Shipped to 325 PNL LAB / 300 AREA  
Possible Sample Hazards None indicated with field instruments

Sample Identification

1) 699-50-53B-208  
1,120 ml. amber glass ADVERSE SOIL; SW 346 Method 9060; Analysis for Total Organic Carbon (T.O.C.)  
2) 699-50-53B-208A  
1,120 ml. amber glass ADVERSE SOIL; SW 346 Method 9060; Analysis for Total Organic Carbon (T.O.C.)

Chain of Possession

Relinquished by: <u>Wendy S. Thompson</u> <u>W.S. Thompson</u>	Received by: <u>RZ Steffler</u> <u>R. Z. Steffler</u>	Date/Time: <u>10/10/90 1000 hrs.</u>
Relinquished by: <u>R. Z. Steffler</u> <u>R. Z. Steffler</u>	Received by: <u>M. W. Hines</u> <u>M. W. Hines</u>	Date/Time: <u>10/10/90 1305 HRS</u>
Relinquished by: _____	Received by: _____	Date/Time: _____
Relinquished by: _____	Received by: _____	Date/Time: _____

BC-1-100



## PART 1: FIELD SECTION

Company Contact H. S. Thompson Telephone (509) 373-3818 0900

200-BP-1 RI / FS

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
699-50-53B-208	120ml. amber;	AQUIFER SOIL;	Analysis for Total Organic Carbon <sup>TOC Method 9060</sup>
699-50-53B-208A	120 ml, amber;	aquifer soil;	Analysis for Total Organic Carbon (TOC) <sup>Method 9060</sup>
NA			

Field Information\*\* Sample to be analyzed for Total Organic Carbon (T.O.C)  
supporting 200-BP-1 RI/FS

Special Handling and/or Storage hand carry to 325 HNL LAB / 300 AREA; by ASL  
Sample van

## PART II: LABORATORY SECTION

Received by William Thie Title Group Leader Date 10/10/90

### Analysis Required

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

BCA-013



SAMPLE RECEIPT FORM

Delivered by: R. STEFFLER Date/Time: 10/11/90 - 1300 Hrs

Received by: MIKE URIE

Customer Sample Number(s): 699-50-52B-214

ALO Sample Number(s): 90-6702

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐
2. Additional Shipping Forms (list): RAS AND REQUEST FOR ANALYSIS
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent ☐  
If Present, Condition: GOOD
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.  
Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature). GOOD
6. Condition of Sample Vials. GOOD
7. Verification of Agreement or Nonagreement of Information on Receiving Documents. AGREE
8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

BC1-314

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson

Telephone (509) 373-3818

Sample Collected by W.S. Thompson

Date 10/11/90

Time 1100

Sample Locations <sup>WST 10/11/90</sup> 699-50-53B wellsite, North of 200 EAST

Ice Chest No. Sleepy poly cooler

Field Logbook and Page No. WHC-N-287-2 pg 49-50

Remarks hand carry sample to 325 PNL for analysis of Total Organic Carbon - same day delivery

Bill of Lading No. NA

Offsite Property No. NA

Method of Shipment hand carry in ice chest in ASL Van to 325 PNL LAB (300m)

Shipped to 325

Possible Sample Hazards none indicated with field instruments

Sample Identification

1) 699-50-53B-214, 1, 120ml. amber glass, soil; total organic carbon. <sup>SW846- Method 9060</sup>

Chain of Possession

Relinquished by: W.S. Thompson

Received by: R. Z. Stull

Date/Time:

10-11-90 11:50

Relinquished by:

Received by:

Date/Time:

10/11/90 12:55

Relinquished by:

Received by:

Date/Time:

Relinquished by:

Received by:

Date/Time:

BOC-115



## PART I: FIELD SECTION

Date Sampled 10/11/90 Time 1100 hours

Telephone (509) 373-3818

200-13 P-1

WSI

None hazards indicated on field instruments

Special Handling and/or Storage keep chilled on ice until delivery to  
325 PNL Lab - same day delivery.

## PART II: LABORATORY SECTION

**Title**

Group Leader

Date 10/11/80

### Analysis Required

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

SAMPLE RECEIPT FORM

Delivered by: Steffler Date/Time: 10/15/40 14:25

Received by: M. Urie

Customer Sample Number(s): 644-52-538-225, 644-55-55-075-073-074A

ALO Sample Number(s): 90-6703, 90-6704, 90-6705, 90-6706

1. Customer Chain-of-Custody Form: Present ✓ Absent \_\_\_\_\_

2. Additional Shipping Forms (list):

RSR  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ✓ Absent \_\_\_\_\_

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

N/A  
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

ICED  
6. Condition of Sample Vials.

GOOD  
7. Verification of Agreement or Nonagreement of Information on Receiving Documents

Agree MUI  
8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

BC1-017

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact W. S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson / RZ. Still Date 10/12/90 Time 1335  
Sample Locations 199-50-538 wellsite  
Ice Chest No. WST 10/15/90 ME-01 Epsilon #5 Field Logbook and Page No. WMC-N-287-2p. 52-53  
Remarks Sample to be analyzed for TOC (Total Organic Carbon)  
WIR 200-BP-1 RT / FS.  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry to 325 PNL LAB (300 AREA)  
Shipped to 325 PNL LAB.  
Possible Sample Hazards none indicated with field instruments

Sample Identification

199-50-538-225

200-BP-1

1, 120ml amber glass, soil, analysis of Total Organic Carbon (TOC)

Chain of Possession

Relinquished by: <u>W. S. Thompson</u> <u>Kendy Thompson</u>	Received by: <u>R. Z. Still</u> <u>R. Z. Still</u>	Date/Time: <u>10/12/90 1350 hrs.</u>
Relinquished by: <u>R. Z. Still</u>	Received by: <u>M. W. [Signature]</u>	Date/Time: <u>10/15/90 11:25</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by: <u>BC1-318</u>	Date/Time:



## PART I: FIELD SECTION

Date Sampled 10/12/90 Time 1335 hours

Telephone (609) 373-3818

205BP-1

[illegible]

Field Information\*\* Sample 2 to be analyzed for Total organic Carbon (TOC)  
200-BP-1 RI/FS.

Special Handling and/or Storage Keep sealed

## PART II: LABORATORY SECTION

Received by

**Title**

Date \_\_\_\_\_

### Analysis Required

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

Attachment 10

Pacific Northwest Laboratory, 200-BP-1, Total Organic Carbon

Data Package 3

200-BP-1, Total Organic Carbon  
Data Package 3

# DATA PACKAGE VERIFICATION

DATE RECEIVED: 12/12/90

SEC #: Report 3, Rev. 0, TOC

LABORATORY: PNL 325 Lab

PROJECT: 200-BP-1

LABORATORY CONTACT: B.M. Gillespie

PROJECT COORDINATOR: J.A. Leach

	PRESENT	ABSENT	TRACEABLE	REMARKS
Internal chain-of-custody	X			
Lab chain-of-custody	X			
Airbill		X		N/A Samples Hand Carried to Lab
Shipping Order		X		N/A Samples Hand Carried to Lab
Signature and Tally		X		N/A Samples Hand Carried to Lab
Hazardous Materials Shipping		X		N/A
Request for Analysis	X			
Case Narrative	X			
Data reporting forms	X			
Raw data	X			
Electronic media		X		N/A

☒ DATA PACKAGE VERIFIED AND ACCEPTED: J.M. Duncan 2-15-91  
Data Management Clerk Date

☐ DATA PACKAGE ACCEPTED WITH REVISIONS: \_\_\_\_\_  
Project Coordinator Date

☒ DATA UNUSABLE/DATA REJECTED: \_\_\_\_\_  
Project Coordinator Date  
2/15/91  
CONCURRED: Cham H. Koonomon 2/15/91  
OSH Manager Date





Westinghouse  
Hanford Company

# OSM RCRA LEVEL C DATA ASSESSMENT

DATE 12/31/90 SAMPLES/MATRIX 55-55-160 52-57-157B  
 REVIEWED BY JA Lerch ✓ -all samples 55-55-160A 52-57-160B  
 LABORATORY PNL-325 begin w/699 prefix 55-55-162 55-55-166  
 CASE # TPP 16772 52-57-160 55-55-190  
 SDG # Report 3; Rev 0 52-57-157A 52-57-162  
TOC 52-57-160A

## DATA ASSESSMENT SUMMARY

QUALITY CONTROL CHECK	ANALYSIS	TOC		
1. <u>Holding time</u>	<u>0</u>			
2. <u>Matrix Spike</u>	<u>0</u>			
3. <u>Duplicate Analysis</u>	<u>X</u>			
4. <u>Blanks (see attach)</u>	<u>0</u>			
5. <u>Calibration/Control Std</u>	<u>0</u>			
6. <u>Other QC</u>	<u>see attach</u>			
7. _____	_____			
8. _____	_____			
9. _____	_____			
10. _____	_____			

0 = data had no problems

X = data qualified due to minor problems

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: no major problems - all results  
acceptable w/qualification

NOTES: see other for PNL-WHC sample ID correlations  
+ sample matrix table

o Refer to the corresponding attachments for explanation of any problems.

RCRA LEVEL C QC

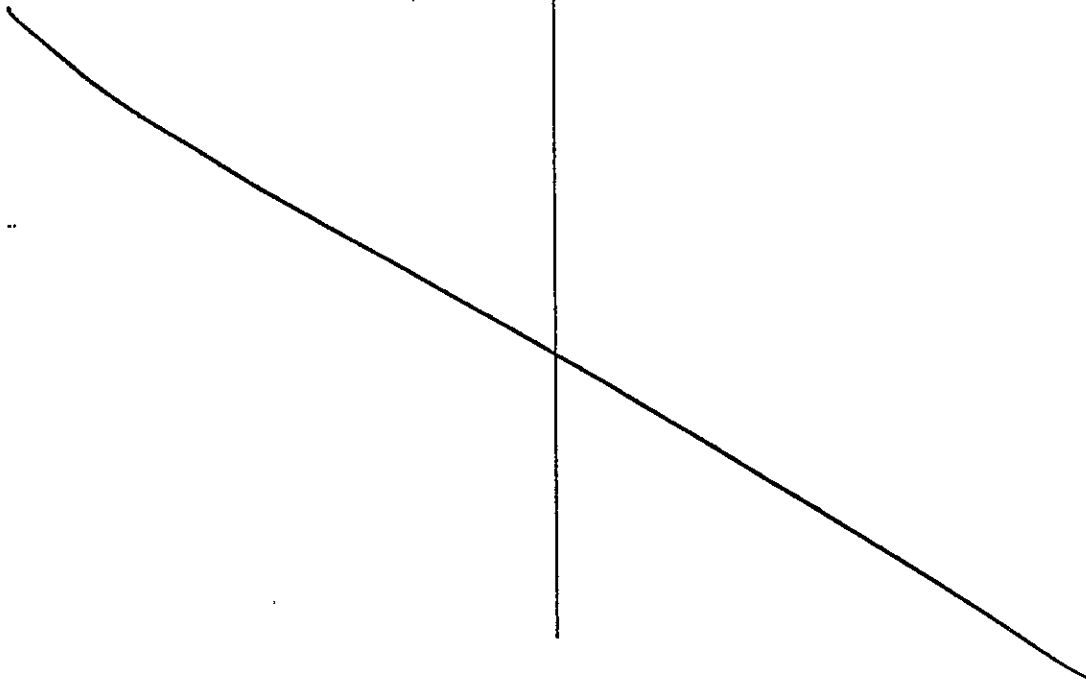
Name JA Lerch Date 12/31/90

QC Check: Holding time

COMMENTS: 28 day holding time met for  
all samples

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name JA Lerch Date 12/31/90

QC Check: Matrix Spike

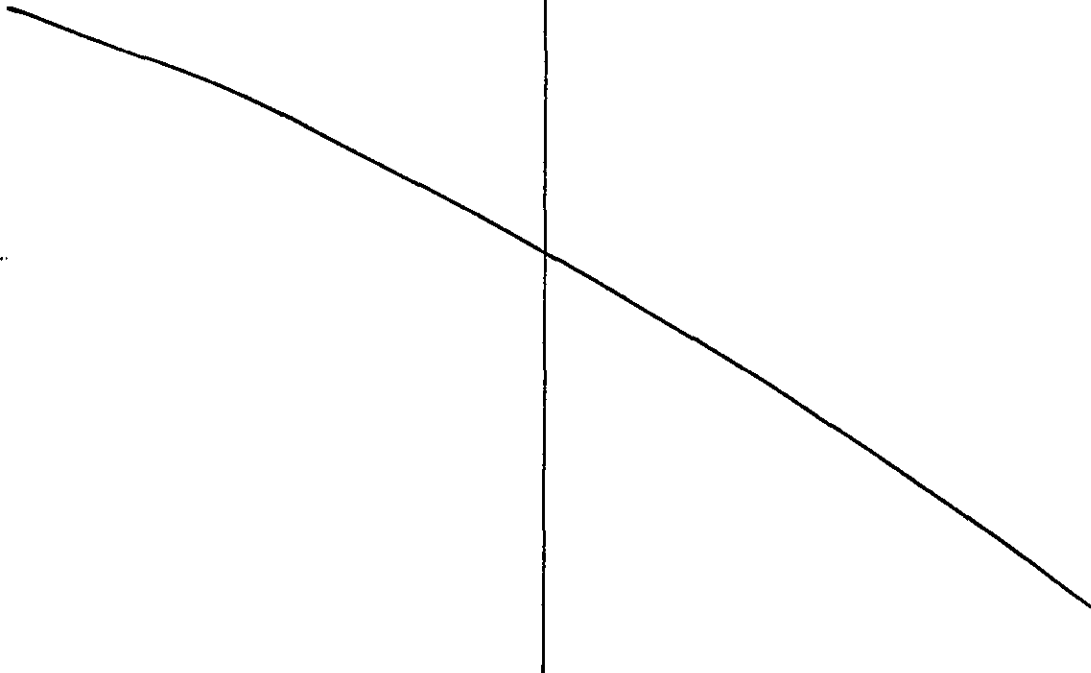
COMMENTS: all MS recoveries for water within  
acceptable limits

- no MS run on soils

• MS not required by TPL or SOW according to Case Narrative

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name JA Kerch Date 12/31/90

QC Check: Duplicate Analysis

COMMENTS: Duplicate RPD high on sample  
699-55-55-162

ACTION: qualify associated results as per  
OSM guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
699-55-55-162	TOC	21.5 J			

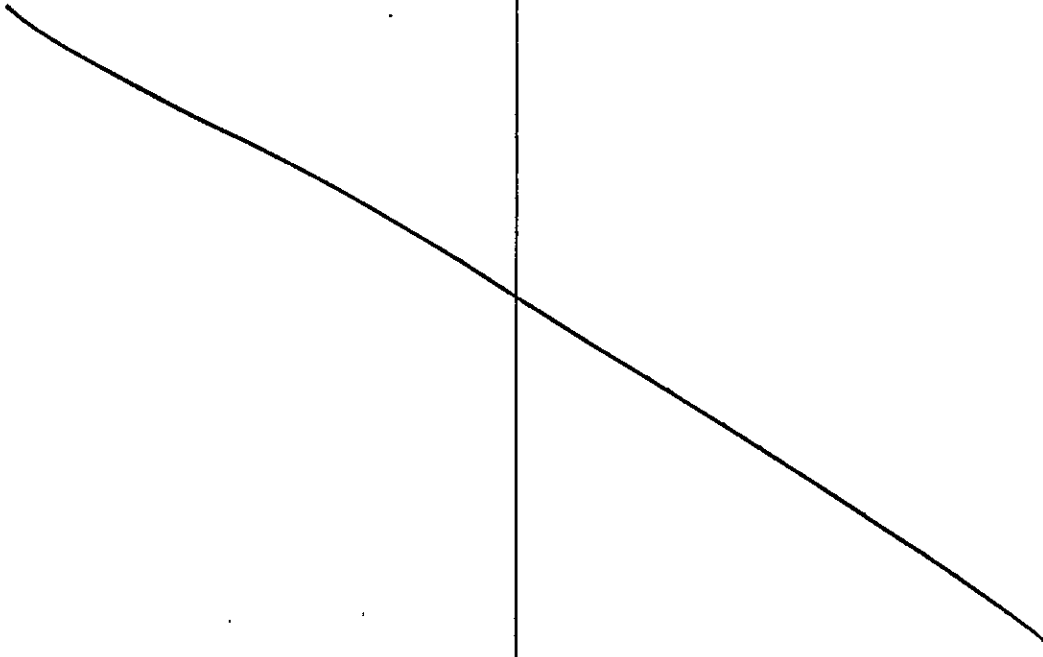
RCRA LEVEL C QC

Name JA Lerch Date 12/31/90

QC Check: Blank Analysis

COMMENTS: Daily blanks are used to set daily  
sample quantitation limits (for more info  
See CASE NARRATIVE: TOC Analysis Results)  
evaluation of contamination cannot be made

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
					

RCRA LEVEL C QC

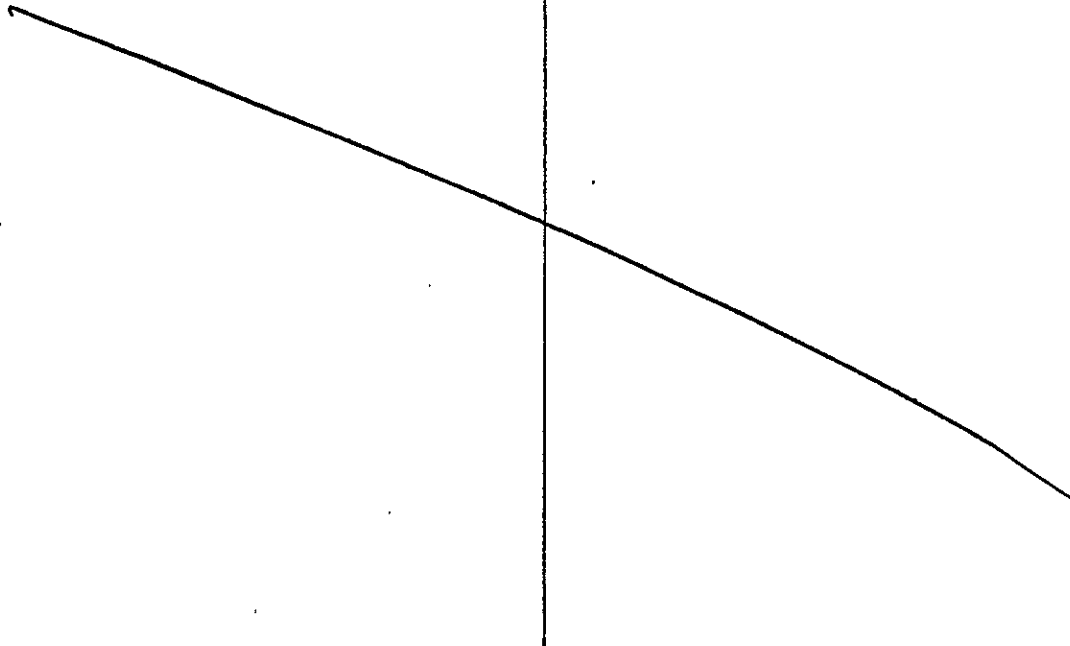
Name JA lerch fl Date 12/30/90

QC Check: Calibration/Control Std

COMMENTS: TOC - all Std recoveries ok

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name JA Lerch JS Date 7/30/90

QC Check: Other QC

COMMENTS: none

ACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
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# 200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 1, Rev 0

Report 2, Rev 0

Report 3, Rev 0

## TOTAL ORGANIC CARBON - soil sample value/qualifier

Sample Number	value/qualifier
Report 1	(ug/g)
49-57B-157.5	73 J
49-57B-157.5D	95 J
49-57B-160	69 J
49-57B-161	113
50-53B-EB	94 J
50-53B-155.7	43 J
48-50-168-1	176
48-50-168-176	149
48-50-168-2	131
48-50-176.7	221
52-54-168.5	280
Report 2	(mg/Kg)
49-57B-216	96.0 J
49-57B-216-A	52.2 J
49-57B-220	39.0 J
49-57B-229	50.0 J
50-53B-208	22.6 J
50-53B-208A	26.5
50-53B-214	14.1
50-53B-225	56.6 R
Report 3	(mg/Kg)
55-55-160	92.3
55-55-160-A	125
55-55-162	21.5 J
52-57-160	61.0
52-57-160-B	84.1
55-55-166	61.5
55-55-190	23.8
52-57-162.0	47.9

R not reported and/or requested

all sample numbers begin with 699- prefix



200-BP-1 SUMMARY TABLE

Laboratory: PNL-325

SDG #: Report 1, Rev 0

Report 2, Rev 0

Report 3, Rev 0

TOTAL ORGANIC CARBON - water  
sample value/qualifier

Sample Number	value (ug/ml)/qualifier
Report 1	
no water samples	
Report 2	
49-57B-216B	0.67 J
49-57B-216C	0.40 J
49-57B-216D	0.16 J
49-57B-229A	1.34 J
Report 3	
52-57-157-A	0.41
52-57-157-B	0.99
55-55-160-A	0.65

NR not reported and/or requested

all sample numbers begin with 699- prefix

## INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the PNL Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building 200-BP-1 Sample Custodian.

The requested analysis for these samples was Total Organic Carbon. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates and methods blanks were analyzed. All QC data that exist are include in this Data Package/Report.

The data in this package are reported in separate tables for soil samples (Table 2) and water samples (Table 3). The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms and one that contains the primary total organic carbon analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPjP ALO-001, for completeness. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie  
B. M. Gillespie  
200-BP-1 Project Manager

12-10-90  
Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjP ALO-001.

J. L. Daniel  
J. L. Daniel  
PNL ACL Quality Representative

12/10/90  
Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
699-55-55-160	90-6716	Soil
699-55-55-160A	90-6717	Soil
699-55-55-162	90-6718	Soil
699-55-57-160	90-6719	Soil
699-52-57-157A	90-6720	Water
699-52-57-157B	90-6721	Water
699-52-57-160A	90-6722	Water
699-52-57-160B	90-6723	Soil
699-55-55-166	90-6724	Soil
699-55-55-190	90-6725	Soil
699-52-57-162	90-6726	Soil

## TOTAL ORGANIC CARBON ANALYSIS RESULTS

7  
1  
1  
0  
0  
4  
3  
2  
2  
1  
1  
6

The soil samples and their accompanying QC samples were prepared by procedure PNL-7-40.37, Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer. The methodology is consistent with SW 846 Method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure and calculations. The water samples and their accompanying QC samples were prepared by procedure PNL-7-40.7, Solutions Analysis: Carbon. Analysis for both soil and water samples was performed in building 325 in the 300 area.

### Soil Samples

With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major source of carbon in the blank is adsorbed CO<sub>2</sub> on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to

determine the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit for that day. For purposes of this report, the daily blank value is used as the lower quantification limit for the analysis. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported for this project. The blank data may be found in data reports titled Total Organic Carbon Data Package No. 1, Total Organic Carbon Data Package No. 2 and in this data package. This "method detection limit," defined as three times the standard deviation of the blank values, is  $\sim 3.4 \mu\text{g}$  of total organic carbon in the analytical sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPJP ALO-001) ranged from 2% to 24%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received and their moisture content. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. The analyst followed the accepted protocol of mixing the sample but heterogeneity still

remained as demonstrated by the duplicate results. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard results (of the same Kodak  $\alpha$ -D Glucose standard) for this set of data, the recoveries ranged from 99% to 102%. The average recovery was 100.0% with a standard deviation of 1.4%. The conclusion is that the precision from this set of data is  $\pm 1\%$  relative, and a bias of 0% on the average.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for all but one (90-6726) of the soil sample analyses in this data report. This one hold time was inadvertently missed as the analyst did not realize that this sample was sampled three days prior to the other sample (90-6725) it was analyzed with and took the sampling date (10-29-90) as the same for both samples. The late analysis has no known impact the final results of the data.

#### Water Samples

With the Dohrman DC80 total organic carbon, a check standard is injected into the instrument repetitively until two successive results are within 1% relative. This standard value is taken as the one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. An average "method detection limit" for this analytical method is estimated

from past analyses at 0.7  $\mu\text{g/ml}$ .

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations ranged from less than 1% to 20%. This variability of difference is mostly attributed to the small amounts of total organic carbon in the water samples. The sample results are near detection limits.

At least one standard is analyzed daily (in at least duplicate) as a one point calibration of the instrument. Upon review of the standard results for this set of data, the recoveries ranged from 77% to 123%. The average recovery for the 10ppm standard was 101% with a standard deviation of 5%. The conclusion is that the precision from this set of data is  $\pm 5\%$  relative, and a bias of +1% on the average. The spike recoveries, however, were not as good. The average recovery was 105% with a standard deviation of 25%. The poor recoveries are attributed to spiking at 2 times the detection limit (detection limit of about 0.7 to 0.8 ppm). The standard deviation of the spike recoveries that are so near the detection limit is expected to be larger than if samples were spiked at five to ten times the detection limit. The spike sample and spike blank analysis was not requested in the TPP or the client SOW for TOC analysis.

The general Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for the water sample analyses in this data report.



Table 2: 200-8P-1 Total Organic Carbon Analysis Data  
Soil Samples

WMC Sample #	PNL ALO #	Sample Type	Sample wt. g	ug C Results	ug C in Sample	mg/Kg Sample	RSD (%) Dups	% rec. spike	Date Sampled	Date Analyzed
699-55-55-160	90-6716-1	Sample	0.28326	28.84	26.13	92.3	8		10-23-90	10-26-90
"	90-6716-2	Duplicate	0.25249	28.81	26.1	103			10-23-90	10-26-90
"	90-6716-3	Standard						99.25		10-26-90
"	90-6716-4	Blank		2.71						10-26-90
699-55-55-160-A	90-6717-1	Sample	0.28147	37.81	35.1	125	8		10-23-90	10-26-90
"	90-6717-2	Duplicate	0.3173	37.97	35.26	111			10-23-90	10-26-90
"	90-6717-3	Standard						99.25		10-26-90
"	90-6717-4	Blank		2.71						10-26-90
699-55-55-162	90-6718-1	Sample	0.55697	14.71	12	21.5 J	24		10-23-90	10-26-90
"	90-6718-2	Duplicate	0.60811	21.29	18.58	30.6			10-23-90	10-26-90
"	90-6718-3	Standard						99.25		10-26-90
"	90-6718-4	Blank		2.71						10-26-90
699-52-57-160	90-6719-1	Sample	0.33163	22.93	20.22	61.0	3		10-23-90	10-26-90
"	90-6719-2	Duplicate	0.39409	25.6	22.89	58.1			10-23-90	10-26-90
"	90-6719-3	Standard						99.25		10-26-90
"	90-6719-4	Blank		2.71						10-26-90
699-52-57-160-B	90-6723-1	Sample	0.3902	34.54	32.83	84.1	3		10-23-90	10-26-90
"	90-6723-2	Duplicate	0.2981	28.93	26.22	88.0			10-23-90	10-26-90
"	90-6723-3	Standard						99.12		10-26-90
"	90-6723-4	Blank		2.71						10-26-90
699-55-55-166	90-6724-1	Sample	0.36091	24.92	22.21	61.5	14		10-24-90	10-26-90
"	90-6724-2	Duplicate	0.40881	33.39	30.68	75.1			10-24-90	10-26-90
"	90-6724-3	Standard						99.12		10-26-90
"	90-6724-4	Blank		2.71						10-26-90
699-55-55-190	90-6725-1	Sample	0.4421	17.1	10.5	23.8	7		10-29-90	11-13-90
"	90-6725-2	Duplicate	0.4401	16.09	9.49	21.6			10-29-90	11-13-90
"	90-6725-3	Standard						101.7		11-13-90
"	90-6725-4	Blank		6.6						11-13-90
699-52-57-162.0	90-6726-1	Sample	0.31368	21.63	15.03	47.9	2		10-26-90	11-13-90
"	90-6726-2	Duplicate	0.27817	19.48	12.88	46.3			10-26-90	11-13-90
"	90-6726-3	Standard						101.7		11-13-90
"	90-6726-4	Blank		6.6						11-13-90

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040,  
325 Bldg., rm 313. Data reported from LRB 52996, pp 53-57.

JZ 12/31/90

Table 3: 200-BP-1 Total Organic Carbon Analysis Data  
Water Samples

WMC Sample #	PNL Sample #	Sample Type	ug/mL Sample	Ave. ug/mL Sample	RSD of Dups (%)	Spike %Rec	C4 Cntrl %Rec	Lab Cntrl %Rec	Date Sampled	Analyzed
		10ppm Lab Cntrl	10.0 9.4 10.1	9.8				98		
		Water Blank	0.08 0.13	0.11						
699-52-57-157-A	90-6720-1	Sample	0.41	0.36	19.6				10-23-90	10-26-90
	90-6720-2	Duplicate	0.31							
	90-6720-3	Sample+Spike	2.06	2.08	1.4	115				
	"	"	2.10							
699-52-57-157-B	90-6721-1	Sample	0.99	0.90	14.1				10-23-90	10-26-90
	90-6721-2	Duplicate	0.81							
	90-6721-3	Sample+Spike	2.04	2.06	1.4	77				
	"	"	2.08							
699-52-57-160-A	90-6722-1	Sample	0.65	0.62	8.0				10-23-90	10-26-90
	90-6722-2	Duplicate	0.58							
	90-6722-3	Sample+Spike	2.65	2.46	10.9	123				
	"	"	2.27							
	90-6722-5	Blank	0.06	0.12						
	"	"	0.17							
	90-6722-4	Blank+Spike	1.89	1.87	1.5		117			
	"	"	1.85							
		10ppm Lab Cntrl	10.6 10.4	10.5	1.4			105		

Total Organic Carbon by PNL Procedure 7-40.7, on Instrument WA64102,  
325 Bldg., rm 400. Data reported from LRB 53093, pp 55.

Samples and Controls spiked at 1.5 ppm. The 1.5 ppm spike level is about 2xDL  
and therefore spikes exhibit somewhat poor recovery

**B1 - WESTINGHOUSE CHAIN OF CUSTODY,  
SAMPLE ANALYSIS REQUEST FORMS  
AND PNL SAMPLE RECEIPT FORMS**

9112301033

**B01-001**

SAMPLE RECEIPT FORM

Delivered by: Steffen Date/Time: 10/24/90 10/24  
Received by: MW Thi  
Customer Sample Number(s): See Back  
ALO Sample Number(s): See Back

1. Customer Chain-of-Custody Form: Present ☒ Absent \_\_\_\_\_  
2. Additional Shipping Forms (list):  
RSR  
Request for Analysis  
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present ☒ Absent \_\_\_\_\_

If Present, Condition: GOOD

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

ICED

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-002

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: Wendy S. Thompson (Envir. Field Services) Telephone (509) 373-3818  
Sample Collected by: W.S. Thompson/R.Z. Steffler Date 10/23/90 Time 1310; 1310; 1445  
Sample Locations: 699-55-55 wellsite, 600 AREA, North of 200 EAST  
Ice Chest No.: "Sleepy" polycooler Field Logbook and Page No.: WHC-N-287-2, 77-79  
Remarks: All samples to be analyzed for TOTAL ORGANIC CARBON (TOC).  
Samples support 200-BP-1 Remedial Investigation/Feasibility Study.  
Bill of Lading No.: NA Offsite Property No.: NA  
Method of Shipment: hand carry to 325 PNL LAB for analysis  
Shipped to: 325 PNL LABORATORY (300 AREA)  
Possible Sample Hazards: No hazards indicated with field instruments

Sample Identification

- 1) 699-55-55-160  
1, 120ml, amber glass; soil; analysis of Total organic carbon (TOC)  
(PNLT-40.37)
- 2) 699-55-55-160A  
1, 120ml, amber glass; soil; analysis of Total organic carbon (TOC)  
PNLT-40.37
- 699-55-55-162  
1, 120ml, amber glass; soil; analysis of Total organic carbon (TOC) PNLT-40.37
- [Crossed out section]
- [Crossed out section]

Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Date/Time: <u>10/23/90</u> <u>1515 hrs</u>
Relinquished by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Received by: <u>M.W. [Signature]</u> <u>M.W. [Signature]</u>	Date/Time: <u>10/24/90</u> <u>1210</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-003

A-6000-407 (04/90)



Westinghouse  
Hanford Company

# SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W.S. Thompson / R.Z. Steffler Date Sampled 10/23/90 Time 1310 hours  
Company Contact Wendy S. Thompson Telephone (509) 373-3818 1310  
1445

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) 699-55-55-160	1, 120ml. amber glass	soil	Total organic carbon (T.O.C) PNL 7-40.37
2) 699-55-55-160A	1, 120ml. amber glass	soil	Total organic carbon (T.O.C) PNL 7-40.37
3) 699-55-55-162	1, 120ml. amber glass	soil	TOTAL ORGANIC CARBON (T.O.C) PNL 7-40.37

Field Information\*\* All samples to be analyzed for Total Organic Carbon (TOC) PNL 7-40.37 supporting the RI/FS for 200-BA-1. Samples delivered to 325 PNL lab for analysis.

Special Handling and/or Storage No hazards indicated with field instruments. Keep samples chilled on wet ice until receipt at lab.

## PART II: LABORATORY SECTION

Received by MW Title Group Leader Date 10/24/90  
Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.

\*\*Use back of page for additional information relative to sample location.

A-6000-406 (07/89)

B01-004

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact Wendy S. Thompson Telephone (509) 373-3818  
Sample Collected by W.S. Thompson / R.Z. Stiffler Date 10/23/90 Time 0935; 0645; 0845  
Sample Locations 699-52-57 well site, North of 200#ST 0935; 0935  
Ice Chest No. \_\_\_\_\_ Field Logbook and Page No. WHC-N-287-2 pg.  
Remarks All samples to be analyzed for total organic carbon  
(T.O.C.) supporting 200-BP1 Remedial Investigation/Feasibility Study  
Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment hand carry to 325 PNL LAB; keep chilled on wet ice  
Shipped to 325 PNL LAB (300 AREA)  
Possible Sample Hazards none indicated with field instruments.

Sample Identification

1) 699-52-57-160  
1, 120 ml., amber glass; soil; analysis of Total Organic Carbon (PNL 7-40.37)  
2) 699-52-57-157A  
1, 250ml, amber glass; water; total organic carbon (PNL 7-40.7) (1/2 ml HCL)  
699-52-57-157B  
1, 250ml, amber glass; water; 1/2 ml. HCL; TOTAL ORGANIC CARBON (PNL 7-40.7)  
4) 699-52-57-160A  
1, 250ml, amber glass; water; 1/2 ml. HCL; TOTAL ORGANIC CARBON (PNL 7-40.7)  
5) 699-52-57-160B  
1, 120ml., amber glass; soil; TOTAL ORGANIC CARBON; (PNL 7-40.37)

Chain of Possession

Relinquished by: <u>Wendy S. Thompson</u>	Received by: <u>R.Z. Stiffler</u>	Date/Time: <u>10/23/90 1515 hrs.</u>
Relinquished by: <u>R.Z. Stiffler</u>	Received by: <u>[Signature]</u>	Date/Time: <u>10/24/90 12:10</u>
Relinquished by: _____	Received by: _____	Date/Time: _____
Relinquished by: _____	Received by: _____	Date/Time: _____

B01-005

A-6000-407 (04/90)



## PART I: FIELD SECTION

Date Sampled 10/23/90 Time 0935 hours

Telephone (509) 373-3818 <sup>0643</sup> <sub>0945</sub>  
0945: 0935

[illegible]

Field Information\*\* Samples to be analyzed for Total Organic Carbon,  
supporting the 200-PP1 RI/FB. (See statement of work)

Special Handling and/or Storage: Keep samples chilled on wet ice until receipt at 325 PNL Lab. No hazards indicated with field instruments.

## PART II: LABORATORY SECTION

Received by MWU Title Group Leader Date 10/24/90  
Analysis Required

\*Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

**B01-006**



Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact: Wendy S. Thompson Telephone: (509) 373-3818  
Sample Collected by: W.S. Thompson/R.Z. Stettin Date: 10/23 <sup>WST-10/24/90</sup> Time: 0825  
Sample Locations: 699-55-55 well site, North of 200 EAST  
Ice Chest No.: "Sleepy poly cooler" Field Logbook and Page No.: WMC-N-287-2 pg. 79  
Remarks: all samples on this Chain of Custody to be analyzed for total organic carbon  
Bill of Lading No.: NA Offsite Property No.: NA  
Method of Shipment: hand carry to 325 PNL LAB.  
Shipped to: 325 PNL LAB.  
Possible Sample Hazards: none indicated with field instruments

Sample Identification

1) 699-55-55-166  
1,120 ml., amber glass; soil; total organic carbon analysis (PNL 7-40.37)

Chain of Possession

Relinquished by: <u>W.S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>R.Z. Stettin</u> <u>R.Z. Stettin</u>	Date/Time: <u>10/24/90</u> <u>0910</u>
Relinquished by: <u>R.Z. Stettin</u> <u>R.Z. Stettin</u>	Received by: <u>M.W. [Signature]</u>	Date/Time: <u>10/24/90</u> <u>12:10</u>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-007

A-6000-407 (04/90)



## SAMPLE ANALYSIS REQUEST

## PART I: FIELD SECTION

Collector W. S. Thompson / R. Z. Steffler Date Sampled 10/24/90 Time 0825 hours  
Company Contact Wendy S. Thompson Telephone (509) 373-3818  
200-RP-1













Field Information\*\* All samples to be analyzed for Total Organic Carbon. This samples supports 200-BP-1 Remedial Investigation / Toxicology Study.

Special Handling and/or Storage Keep chilled on wet ice until delivery at  
325 PNL LAB. No Hazards indicated by field instruments

**PART II: LABORATORY SECTION**

Received by MW Kim Title Group Leader Date 10/24/90  
Analysis Required \_\_\_\_\_

Indicate whether sample is soil, sludge, water, etc.

**\*\*Use back of page for additional information relative to sample location.**

**A-6000-406 (07/89)**

**B01-008**

SAMPLE RECEIPT FORM

Delivered by: Steppler Date/Time: 10/30/90 11:10  
Received by: Ure  
Customer Sample Number(s): 699-55-55-190 699-52-57-162  
ALO Sample Number(s): 90-6725 90-6726

1. Customer Chain-of-Custody Form: Present ☒ Absent ☐
2. Additional Shipping Forms (list):  
Request for Analysis
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.  
Present ☒ Absent ☐  
If Present, Condition: \_\_\_\_\_

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

GOOD - OKAY

6. Condition of Sample Vials.

GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

Agree

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-009

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Company Contact Wendy S. Thompson Telephone (509) 373-3818

Sample Collected by J.W. Roberts / R. Z. Steffler Date 10/29/90 Time 1153

Sample Locations 699-55-55 Wellsite (600 Area: 1/2 mile N. of Four Corners)

Ice Chest No. Alpha #4 Field Logbook and Page No. WHC-N-287-2

Remarks All samples to be analyzed for TOTAL ORGANIC CARBON

Bill of Lading No. - N/A - Offsite Property No. - N/A -

Method of Shipment Hand carry by ASL Sample Van to 325 PNL Lab.

Shipped to 325 PNL Lab (300 Area)

Possible Sample Hazards None indicated with Field Instruments

Sample Identification

1) 699-55-55-190

1, 120 ml; amber glass; soil; TOTAL ORGANIC CARBON (PNL 7-40.37)

Chain of Possession

Relinquished by: J.W. Roberts

Received by:

Date/Time:

J.W. Roberts

R. Z. Steffler

10-29-90 12:20

Relinquished by:

Received by:

Date/Time:

R. Z. Steffler

Steven E. Kue

10/29/90 12:29

Relinquished by:

Received by:

Date/Time:

Steven E. Kue

R. Z. Steffler

10/30/90 10:12

Relinquished by:

Received by:

Date/Time:

R. Z. Steffler

W. W. W. W.

10/30/90 11:10

B01-010

A-6000-407 (04/90)

Westinghouse Hanford  
Company  
T 10/26/90

# CHAIN OF CUSTODY

Company Contact W Wendy S. Thompson Telephone (509) 373-3818  
Sample Collected by S.E. Kos / R.Z. Steffler Date 10/26/90 Time 1403  
Sample Locations 699-52-57 wellsite, North of 200 EAST  
Ice Chest No. Alpha #4 Field Logbook and Page No. WHC-N-287-2  
Remarks All samples to be analyzed for total organic carbon

Bill of Lading No. NA Offsite Property No. NA  
Method of Shipment Hand carry by ASL Sample van to 325 PNL LAB  
Shipped to 325 PNL LAB (300 Area)  
Possible Sample Hazards None indicated with field instruments

## Sample Identification

1) 699-52-57 - 162.0 FT  
1,120ml, amber glass; soil; Total Organic Carbon (PNL 7-40.37)

## Chain of Possession

Relinquished by: <u>STEVEN E. KOS</u> <u>Steven E. Kos</u>	Received by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Date/Time: <u>10/26/90 1435</u>
Relinquished by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Received by: <u>Steven E. Kos</u> <u>Steven E. Kos</u>	Date/Time: <u>10/29/90 1229</u>
Relinquished by: <u>Steven E. Kos</u> <u>Steven E. Kos</u>	Received by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Date/Time: <u>10/30/90 10:12</u>
Relinquished by: <u>R.Z. Steffler</u> <u>R.Z. Steffler</u>	Received by: <u>M.W. Thun</u> <u>M.W. Thun</u>	Date/Time: <u>10/31/90 11:10</u>

B01-011

A-6000-407 (04/90)



**PART I: FIELD SECTION**

Date Sampled 10/26/90 Time 1403 hours

Telephone (509) 373-3818

100

Special Handling and/or Storage hand carry complete lab - keep on wet ice  
until receipt at 325 PHL LAB; no hazards indicated with  
field instruments.

**PART II: LABORATORY SECTION**

Received by THW Title Group Leader Date 10/30/90  
Analysis Required

**A-6000-406 (07/89)**

**B01-012**